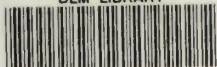


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United States Department of the Interior  
Bureau of Land Management  
Bakersfield District  
Hollister Resource Area

August, 1992

Draft

# Hollister

## Oil and Gas RMP Amendment and Environmental Impact Statement





## BLM Mission Statement

The Bureau of Land Management is responsible for the balanced management of Public Lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, and natural, scenic, scientific and cultural values.

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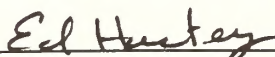
**HOLLISTER OIL & GAS RMP AMENDMENT**

**AND**

**ENVIRONMENTAL IMPACT STATEMENT**

**United States Department of the Interior**

**Bureau of Land Management**



**State Director  
California**

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# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

### CALIFORNIA STATE OFFICE

2800 Cottage Way  
Sacramento, California 95825

Dear Reviewer:

Enclosed for your review and comment is the Bureau of Land Management's Draft Resource Management Plan Amendment and Draft Environmental Impact Statement for oil & gas leasing in the Hollister Resource Area. The document outlines five alternatives for managing oil & gas leasing on public lands in the resource area. These alternatives address management issues identified during public meetings and agency scoping conducted early in the planning process. The selected alternative will guide oil & gas leasing on approximately 310,000 acres of public lands and 385,000 additional acres of private lands with federal ownership of subsurface minerals. Currently, Alternative "D" (NSO On T&E Plant Habitat/Pinnacles Viewshed) is the Preferred Alternative.

Comments concerning the Draft Plan Amendment/EIS will be considered in preparing the Final Plan and EIS. Public meetings (times, dates and places will be announced later) will be held in March to explain draft decisions and to receive comments. For additional information please contact the Hollister Resource Area at the address below or at (408) 637-8183.

All comments must be received by November 20, 1992.  
Please send your comments to:

Hollister Area Manager  
Bureau of Land Management  
20 Hamilton Court  
Hollister, CA 95023

Sincerely,

Edward L. Hastey  
State Director







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# MOBILE AREA OFFICE

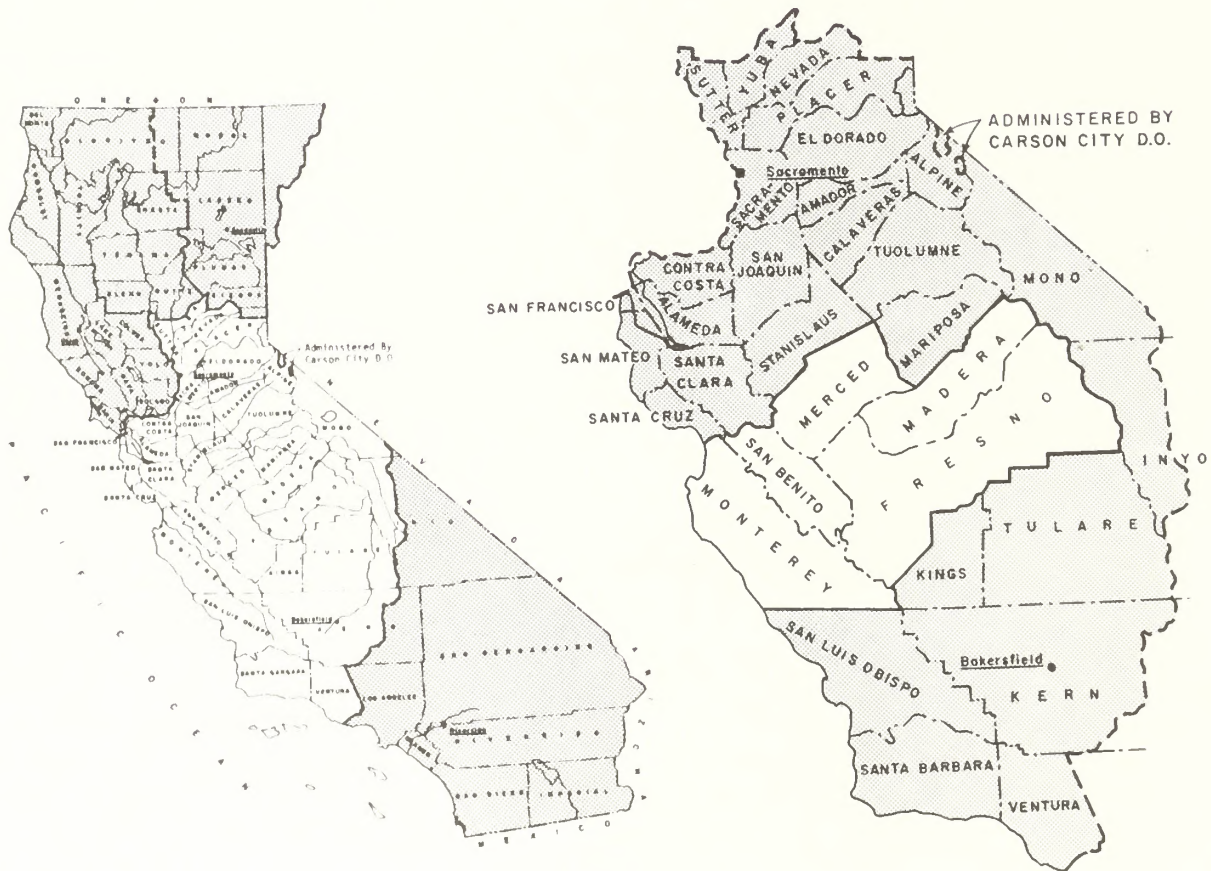
INVESTIGATION OF THE ALLEGED  
KIDNAPING OF JAMES EARL RAY

MEMPHIS, TENN.



# HOLLISTER RESOURCE AREA

## GENERAL LOCATION



BAKERSFIELD DISTRICT  
CALIFORNIA

HOLLISTER RESOURCE AREA  
BAKERSFIELD DISTRICT

X

MAP 1

# SUMMARY

This Environmental Impact Statement evaluates alternative plans for oil and gas leasing on federal lands managed by the Bureau of Land Management in the Hollister Resource Area. These lands are in the Central California counties of Monterey, San Benito, Fresno, Madera, and Merced. This document is also a proposed amendment to the Hollister Resource Area management plan (RMP).

Six issues were identified during the public scoping process for consideration in the RMP Plan Amendment. The issues are impacts of oil & gas exploration and development on 1) air quality, 2) threatened, endangered and other special status plants, 3) threatened, endangered and other special status animals, 4) visual quality, 5) groundwater or surface water quality, and 6) the impacts of any restrictions on opportunities for mineral exploration and development.

Five alternatives, including a continuation of current management practices, were considered. The alternatives explored options to reduce impacts by not issuing new leases, using a "conditional" No Surface Occupancy stipulation that could be waived following verification that impacts could be avoided or adequately mitigated, and use of permanent No Surface Occupancy stipulations.

BLM petroleum geologists have developed "Reasonably Foreseeable Development Scenarios" to estimate the amount of oil & gas exploration or development activity that would occur under each alternative. These evaluations indicated that most activity is expected to occur within the existing oil fields. The potential for discovery of a new oil & gas field on federal lands was estimated to be less than five percent.

The analysis of environmental impacts found that opportunities to reduce environmental impacts may be limited since most activity is expected to occur on areas already under lease in the oil fields. Any new restrictions on these operations would have to be consistent with the lease holders rights to explore for and develop any oil & gas deposits within the lease.

The Preferred Alternative is Alternative "D" (NSO On T&E Plant Habitat/Pinnacles Viewshed). This alternative has been selected because it would allow for continued exploratory drilling and hold open the opportunity for the discovery of new oil & gas resources on public lands, while also providing for all practical measures to minimize or eliminate environmental impacts. This alternative would include the following restrictions on oil & gas leasing:

- A) 5,500 acres of public land and 17,900 acres of private land with federal mineral ownership would not be available for leasing. These areas are the Squaw Leap



Management Area, the California Coastal Zone, and the Carmel River watershed. These areas have no oil & gas potential.

- B) 23,782 acres of public land currently being considered for wilderness would not be available for leasing unless Congress makes a determination they are not suitable for wilderness designation.
- C) 3,640 acres of public land and 480 acres of private land with federal mineral ownership within the foreground watershed of the Pinnacles National Monument would be subject to a No Surface Occupancy stipulation. There would be no provision for waiving of this stipulation.
- D) 83,160 acres of public land and 85,000 acres of private land with federal mineral ownership that is potential or known habitat for three threatened or endangered plant species would be subject to a No Surface Occupancy stipulation. This stipulation could be waived following inventories and verification that surface occupancy would not impact these species.

Additional mitigation measures that would be required include limiting new oil & gas development within threatened or endangered (T&E) animal habitat to one pad per 40 acres, requiring air modelling studies prior to any new air emissions in the vicinity of Pinnacles National Monument, and requiring off-site mitigation for any loss of T&E or wildlife habitat. Off-site mitigation could include acquisition and/or improvement of other habitat areas.

Despite these restrictions and mitigation measures, some significant environmental impacts could still result from the oil & gas leasing program. These impacts result primarily from continued operations on producing oil leases in the oil fields of the Coalinga/Avenal area.

There is a risk that unknown populations of three T&E listed plants (San Joaquin woolly-threads, California jewelflower, & Hoover's woolly-star) and two plants currently being considered for T&E listing (hollisteria & forked fiddleneck) could be destroyed on existing leases in the Jacalitos and Kettleman North Dome oil fields. Restricting new operations in these oil fields until adequate inventories can be conducted could require deferring any activity for several years if drought conditions prevail. This could conflict with existing lease rights. To minimize the potential for these impacts, the BLM would notify lease holders of the potential conflict and recommend they schedule inventories during the next season when growing conditions are satisfactory. The BLM would also seek funding to conduct these inventories. Exploration and development in chaparral habitats could also destroy habitat for another plant being considered for T&E listing (one-awned spineflower).

Continued development in the Coalinga/Avenal oil fields could also result in the loss of endangered San Joaquin kit fox and blunt-nosed leopard lizard populations. Population numbers are currently low and additional habitat loss and direct mortality could affect the ability of the populations to sustain themselves. Acquisition and transfer to BLM of off-site mitigation lands



would be required to compensate for these impacts. Restoration of T&E species habitat would also be the priority objective for reclamation of redundant oil well facilities.

There would also be increased emissions of air pollutants contributing to the continued failure of Fresno County to meet federal air quality standards. Activities on federal leases would be required to use all Best Available Control Technology (BACT) to minimize air emissions, including evaluation of the potential to use electric motors in lieu of diesel-powered drill rigs and pumpjacks.

# **CHAPTER ONE**

## **PURPOSE AND NEED**

### **INTRODUCTION**

This Draft Land Use Plan Amendment and Environmental Impact Statement (EIS) evaluates alternative strategies for oil and gas leasing on federal lands managed by the Bureau of Land Management (BLM) in the central California counties of Monterey, San Benito, Fresno, Madera, and Merced (see Map #1). The existing land use plan or Resource Management Plan (RMP) was adopted in 1984. The scope of this plan amendment is limited to a review of decisions related to oil & gas leasing on the public lands.

Lands affected by this EIS and RMP Amendment include about 310,000 acres of public lands and 385,000 additional acres of private lands with federal ownership of subsurface minerals. These lands are managed by the BLM's Hollister Resource Area. This EIS and RMP Amendment will not affect offshore rocks and islands which were closed to oil and gas leasing following completion of the California Rocks and Islands Area of Critical Environmental Concern Plan Amendment in 1990.

Leasing of oil & gas rights on federal lands could result in oil exploration and/or development activity including drilling of exploration wells, and discovery and development of new oil fields. Most activity however is expected to occur within the existing developed oil and gas fields. In actuality, exploration wells have been drilled on fewer than 5% of the federal leases issued in California.

To assist in this assessment of potential environmental impacts, BLM geologists have evaluated the oil & gas potential of the public lands, and have developed "reasonably foreseeable development scenarios". These scenarios project the level of development that is expected to occur on the private and public lands during the next 15 years. The scenarios indicate that less than 0.2% of the federal lands in the Hollister Resource Area would be affected by O&G leasing. Most of these actions would occur within the developed oil fields where federal lands are already under lease. These leases are not expected to be available for renewal during the life of this plan. Map #2 shows areas that are already under O&G lease, and the O&G potential of Hollister Resource Area lands.

The EIS and RMP Amendment considers five alternative strategies for managing O&G leasing on the BLM lands. These strategies or alternatives range from a continuation of the current leasing practices with no new stipulations or restrictions, to curtailment of the leasing program. The assessment of environmental impacts focuses on the key environmental issues of: 1) air quality, 2) threatened, endangered and other special status plant species, 3) threatened,



endangered and other special status animal species, (4) visual quality, (5) groundwater or surface water quality, and (6) opportunities for mineral exploration & development.

## **PURPOSE AND NEED**

Management of public lands in the Hollister Resource Area is guided by the Hollister Resource Management Plan (RMP) which was adopted in 1984 (USDI 1984). A review of recent court decisions (Conner vs Burford) and Supplemental Program Guidance issued by the BLM (BLM Manual 1620) indicate that portions of the plan addressing oil & gas exploration and/or development do not meet current standards. The RMP and supporting environmental documentation did not consider potential development scenarios and cumulative impacts of oil & gas development.

The proposed action is to amend the Hollister Resource Management Plan to more fully address issues related to oil & gas exploration and/or development. Decisions will be made regarding what areas should be available for oil & gas leasing, and what stipulations, if any, should apply to each area.

About 25% of the federal land in the Hollister Resource Area, including all federal land in the developed oil fields, is already under lease for oil & gas exploration and development. New stipulations cannot be applied to these existing leases. Operators are required to obtain specific authorization for new exploration or development activities on leased lands. Existing lease operations could be affected by decisions made in this plan, since elements of new stipulations could be applied as mitigating measures to approvals for new activities on existing leases (Applications for Permits to Drill, etc.). Any new restrictions would, however have to be consistent with the lease rights of the lessees, and could not preclude exploration and development of potential oil & gas resources.

## **DESCRIPTION OF THE PLANNING AREA**

The Hollister Resource Area is located in central California and includes about 310,000 acres of public lands and 385,000 additional acres of private lands with federal ownership of subsurface minerals in the counties of Monterey, San Benito, Fresno, Madera, and Merced.

The Hollister Resource Area is bordered on the west by the Pacific Ocean, Los Padres National Forest and Fort Hunter Liggett Military Reservation, and on the east by the Sierra and Sequoia National Forests. The highly varied major landforms include the Central Coast Range and the Sierra Nevada foothills, as well as the Salinas and San Joaquin Valleys. About two-thirds of the resource area consists of chaparral and oak woodland vegetation. The remaining third consists of annual grasslands located on the eastern slopes of the Diablo range bordering the San Joaquin



Valley and in the southern Salinas Valley. The terrain is typically steep and mountainous. Elevations range from near sea level to over 5,000 feet.

Federal oil and gas production currently occurs in three areas: the tectonically distinct Salinian Block contains the San Ardo oil field in southern Monterey County; across the San Andreas Fault to the east lie fields bordering the Great Central Valley, these include those of western Fresno County (Coalinga, Jacalitos, North Kettleman, and East Coalinga, etc.), and in east-central San Benito County, the Vallecitos field.

Most activities anticipated in conjunction with this plan are expected to occur in or adjacent to the developed oil fields in the vicinity of Coalinga and Avenal. The predominant landscape features of the Coalinga/Avenal area are low, rolling foothills and valley grasslands which border the western edge of the San Joaquin Valley. The area lies within the rain shadow of the Diablo Range to the west and is consequently very arid. Vegetation is characteristic of the valley grassland complex consisting of a variety of annual grasses and herbaceous forbs. Common shrubs include saltbush (*Atriplex spp.*) and in the higher elevations there are scattered California juniper.

## **THE PLANNING PROCESS**

The BLM process to amend a resource management plan follows the same procedure that is used to develop a new plan. These steps and opportunities for public participation are highlighted below:

### **Step 1. Identification of Issues**

This step identifies resource management concerns, environmental concerns, and opportunities that can be addressed in the planning process. The selection of issues provides a focus for the remainder of the plan amendment and EIS process. Public participation in this process, called scoping, has included three workshops and notification of all affected or interested parties. A Notice of Intent to prepare the plan amendment and EIS was published in the Federal Register on January 24, 1990. The following section of this chapter contains a more detailed discussion of the issues selected for this plan amendment and EIS.

### **Step 2. Development of Planning Criteria**

This step identifies the laws, regulations, policy, and management guidance that will govern the consideration of each issue and the selection of alternatives. There is a formal 30-day public review of the planning criteria that is initiated with publication of a Notice of Availability (NOA) in the Federal Register. The NOA was published in the

Federal Register on June 6, 1991. The planning criteria identified for this plan amendment and EIS are described in Appendix A.

### **Step 3. Collection of Inventory Information**

This step collects the data needed to resolve resource management and environmental issues that will be addressed in the plan amendment and EIS. Data for the analysis was obtained primarily from existing sources. Some field inventories were conducted to supplement existing data. Inventories conducted in support of this plan amendment included a botanical inventory of 11,820 acres on federal lands in or adjacent to the developed oil fields near Coalinga and Avenal.

### **Step 4. Analysis of the Management Situation**

This step assesses the current situation and provides a baseline for development of the RMP Amendment. This data forms the basis for the "Affected Environment", the description of the "No Action Alternative", and the development of realistic alternative actions.

### **Step 5. Formulation of Alternatives**

This step prepares several complete, reasonable resource management alternatives. The Current Management Alternative describes present management while other alternatives range from additional development to management strategies to reduce environmental impacts or address resource management issues. The Current Management Alternative and four alternative actions are analyzed in this EIS/Plan Amendment.

### **Step 6. Estimation of Effects**

This step analyzes the physical, biological, economic, and social impacts of implementing each alternative. The analysis focuses on the environmental issues identified during Step 1 of this process.

### **Step 7. Selection of the Preferred Alternative**

This step compares the impacts of each alternative and selects the preferred alternative. The selection and analysis of alternatives is documented in the draft RMP Amendment/EIS which is circulated for public review.

### **Step 8. Selection of the Plan Amendment**

This step analyzes public comments, modifies the alternatives as appropriate, and selects the alternative to be adopted as part of the Resource Management Plan (RMP). The proposed Plan Amendment and final EIS is distributed to the public in the final RMP



Amendment/EIS document. A 30-day protest period and a 60-day review by the Governor is allowed before the RMP is adopted. A Record of Decision and approved RMP is published after a consideration of any protests.

#### **Step 9. Monitoring and Evaluation**

This step involves monitoring and evaluating the resource conditions as the approved RMP is implemented. If monitoring shows that resource issues are not being satisfactorily resolved or that the desired results outlined in the adopted plan are not being met, the RMP may be amended or totally revised.

## **THE BLM OIL AND GAS LEASING PROGRAM**

The BLM administers the public lands in accordance with the Federal Land Policy and Management Act of 1976 and other laws. The leasing of oil & gas resources is governed by the 1920 Mineral Leasing Act. This law applies to all federally owned minerals. In some cases the surface of the land may be owned by a private individual while the minerals still belong to the federal government. In the Hollister Resource Area there are about 310,000 acres of public lands and 385,000 additional acres of private land with federal ownership of the subsurface minerals. The Mineral Leasing Act provides that all of these lands are open to oil and gas leasing unless a specific order has been issued to close the area to leasing.

The BLM offers lands for lease to the highest qualified bidder in a competitive sale. The lease term is five years. The maximum size of each lease is 2,560 acres. Each lease is subject to standard terms and conditions, and may also be subject to special stipulations. Special stipulations can include seasonal restrictions or even a prohibition against any use of the surface. This later restriction is called a No Surface Occupancy stipulation, and is often used when development could have unacceptable environmental impacts. Section six of the standard lease terms provides for mitigation of environmental impacts as a condition of the lease.

**Section 6. Conduct of operations - Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or right-of-ways. Such**



uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications to reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

The lessee must post a bond before commencing any surface disturbing activities on a lease. The size of the bond is set by BLM regulations. The size of the bond can be increased if the operator has a poor compliance record. The purpose of the bond is to provide a financial assurance that all appropriate procedures and stipulations will be followed.

Exploratory oil wells have historically been drilled on less than 5% of the leases issued. After obtaining a lease and prior to drilling, a lessee submits an Application for Permit to Drill (APD) indicating the specific location of the drilling site. The BLM conducts an environmental review of the drilling proposal, and may require additional mitigation measures as conditions for approval of the APD. These measures however, cannot be so restrictive as to preclude the exploration and development of potential mineral resources on the lease.

Historically only one of 15 to 20 exploratory wells drilled actually results in the discovery of oil (Milliken 1990c). Unsuccessful wells are abandoned with the surface reclaimed. If oil is discovered and recovery is economical, then the lessee may develop the field for oil production. The lease remains in effect as long as oil or gas is being actively produced from the lease. When it is no longer economically feasible to extract oil or gas, the lessee prepares a plan for abandonment of the lease. This plan is reviewed and modified or approved by the BLM. The well is plugged, all facilities are removed and the site is reclaimed.

Geophysical explorations can also occur on leases, however these geophysical activities can also be conducted on lands that are not under lease. BLM authorization is required for geophysical explorations. An environmental evaluation is completed before the authorization is issued to determine appropriate stipulations to protect public resource values. Bonds are also required before geophysical explorations are authorized.

A more detailed description of surface disturbance resulting from oil & gas operations on public lands is contained in Appendix B.

## ISSUES

The BLM planning process is issue driven. The development of management proposals is based on the issues identified through public input, resource monitoring, and regulatory or policy mandate.

Six issues were identified during the public scoping process for consideration in this RMP Plan Amendment. The issues are impacts of oil & gas exploration and development on 1) air quality, 2) threatened, endangered or other special status plants, 3) threatened, endangered or other special status animals including raptors, 4) visual quality, 5) groundwater or surface water quality, and 6) the impacts of any restrictions on opportunities for mineral exploration and development.

### **Issue #1 - Air Quality**

Oil and gas exploration/development generates several pollutants which can have a negative impact on air quality. O&G activities on federal land have been projected to be concentrated within the existing oil fields in Monterey, Fresno, and San Benito counties. All of these counties currently exceed federal standards set by EPA for various air pollutants. Violations of these standards are important because they indicate levels of pollution that have an adverse impact on human health and public welfare.

Recent testing has also indicated that federal standards for ozone are being exceeded at Pinnacles National Monument which has been designated a Class I air quality area by the California Air Resources Board. For Class I areas, the Clean Air Act requires special management to control total suspended particulates and sulfur oxide emissions, and requires the prevention of any reduction in visual range or atmospheric discoloration due to man-made pollution.

Specific decisions that need to be considered include: 1) are existing air quality permit procedures sufficient to assure that O&G activities on federal lands are not contributing to the air quality problems, 2) what technology should be required to reduce emissions, 3) are stipulations needed for leases upwind from Class I areas, and 4) should surface occupancy or leasing be prohibited in some areas to avoid air pollutant emissions.



## Issue #2 - Threatened, Endangered and Other Special Status Plants

There are four threatened or endangered plant species and 97 other plant species with special status known to occur in the Hollister Resource Area. The threatened San Benito Evening Primrose (*Camissonia benitensis*) occurs only in the Clear Creek Management Area where no oil & gas exploration and development activities are expected to occur. The potential habitat for three newly listed species, however, includes many of the currently developed oil & gas fields where most of the future projected O&G activity is expected to occur. These three species are the endangered California jewelflower (*Caulanthus californicus*) and San Joaquin woolly-threads (*Lembertia congdonii*), and the threatened Hoover's woolly-star (*Eriastrum hooveri*). These areas also contain habitat for two special status plant species, the hollisteria (*Hollisteria lanata*) and the green fiddleneck (*Amsinckia furcata*).

The California jewelflower, San Joaquin woolly-threads, and Hoover's woolly-star and the two special status species are annual herbs whose localities can only be identified during the limited spring growing season. Limited botanical inventories to identify locations of these species on federal lands in the vicinity of the existing oil fields were conducted during the spring of 1991.

The Endangered Species Act of 1973 (as amended) requires the BLM to insure that its actions do not jeopardize the continued existence of listed threatened or endangered species.

Specific decisions that need to be considered include: 1) should surface occupancy be allowed on parcels known to contain special status plant species, 2) what level of inventory should be required on potential habitat prior to leasing and/or development, 3) are stipulations needed or can these species be protected by existing authorities to move most surface disturbing activity up to 200 meters from the initial proposed site, and 4) are stipulations needed to assure that surface disturbance activity does not take place until spring inventories of proposed sites can be completed.

## Issue #3 - Threatened, Endangered, and Other Special Status Animals

There are five endangered animal species that occur on public lands in the Hollister Resource Area. The habitat for three of these species includes many of the currently developed oil & gas fields where most of the future projected O&G activity is expected to occur. These three species are the endangered blunt nosed leopard lizard (*Gambelia silus*), giant kangaroo rat (*Dipodomys ingens*), and the San Joaquin kit fox (*Vulpes macrotis mutica*). In addition to these endangered species, this habitat also may support populations of the rare San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), short-nosed kangaroo rat (*Dipodomys nitrotoides brevinasus*), San Joaquin pocket mouse (*Perognathus i. inornatus*), and five rare beetles.



Most of the habitat occupied by these species is included in the Panoche /Coalinga RTE Area of Critical Environmental Concern (ACEC) (USDI 1987). The management plan for this ACEC includes numerous measures to mitigate impacts to these species resulting from oil & gas exploration and development. These measures are described in Appendix C.

Specific decisions that need to be considered include: 1) should O&G exploration and development activities be allowed in habitat for these T&E animals, 2) are measures outlined in the ACEC plan sufficient or necessary to preclude adverse impacts to species of concern, 3) what additional measures may be appropriate, 4) do these measures need to be incorporated into leases as a stipulation, 5) are stipulations needed to protect peregrine falcon or other raptor species, and 6) are stipulations needed to preserve sites historically occupied by the California condor.

#### **Issue #4 - Visual Quality**

Oil & gas exploration and development can result in adverse impacts to the visual quality of areas with scenic values. During the development of the Hollister Resource Management Plan several areas were identified for special management of the visual landscape. These areas were designated Visual Resource Management (VRM) Class II or Class III.

The only areas designated for Class II visual management, where the objective is to maintain the existing character of the landscape, are the public lands adjacent to the Pinnacles National Monument that are in a common watershed with monument lands. These areas have a moderate or no O&G potential with little likelihood of any O&G exploration or development activity.

Among the areas identified as Class III, where the management objective is to allow moderate activities that do not dominate the view of the casual observer, are the expansive grass covered Panoche and Tumey hills that are visible from I-5. These areas have a moderate O&G potential, and some O&G exploration activity can be expected to occur here.

Specific decisions that need to be considered include: 1) is topographic and vegetative screening sufficient to adequately obscure anticipated developments to assure compliance with VRM management objectives, 2) are existing VRM classifications appropriate, 3) should surface occupancy or leasing be prohibited within the foreground viewshed of Pinnacles National Monument, 4) should visual stipulations be attached to leases adjacent to the Pinnacles National Monument, and 5) are stipulations needed to preserve vistas of natural landscapes from the I-5 corridor.

## **Issue #5 - Groundwater or Surface Water Quality**

Wells drilled with inadequate casings or improperly sealed following abandonment can result in contamination of groundwater. Increased sedimentation and oil spills can result in contamination of surface waters and/or groundwater.

While the potential for oil spills is generally considered small, there is still public concern over the potential impact of spills on water resources. In 1989 an oil spill from a storage tank on a federal lease in the Vallecitos field resulted in contamination of the Silver Creek drainage.

The BLM currently has standard operating procedures that are designed to protect groundwater resources during oil & gas exploration activities. These standard operating procedures cover well casing requirements, subsurface disposal of wastes, spill contingency plans, and abandonment procedures.

Specific decisions that need to be considered include: 1) are existing standard operating procedures sufficient to preclude contamination of groundwater resources, and 2) are additional stipulations/procedures needed to reduce the potential for oil spills in the proximity of surface water resources.

## **Issue #6 - Mineral Exploration and Development**

Mineral exploration and development provides an important source of revenue to the Federal and State government through rental and royalty income, and provides employment opportunities.

California is currently the fourth largest oil producing state in the United States. Most of California's oil is produced in the southern San Joaquin Valley. California, however, only produces about half of the state's petroleum needs. The remaining oil is imported by pipeline or tanker. Partially in response to declining domestic oil production, there are continuing pressures for increased off-shore oil production.

Specific concerns that need to be considered are: 1) how will restrictions placed on oil & gas exploration and development activities on public lands affect domestic oil production, 2) will these restrictions create a demand for additional oil pipeline construction, tanker traffic, or off-shore oil production, and 3) what impact will these decisions have on government revenues and local employment opportunities.



# **CHAPTER TWO**

## **DESCRIPTION OF THE ALTERNATIVES**

### **INTRODUCTION**

The alternatives have been selected to provide a range of management options to resolve conflicts associated with the identified issues including an increase or decrease in the amount of acreage available for oil & gas leasing. The specific alternatives have been developed to consider avoidance of leasing or surface occupancy in areas with sensitive environmental concerns. Under all alternatives, all areas available to leasing would be subject to all practical and feasible mitigation measures needed to minimize environmental impacts.

### **MANAGEMENT GUIDANCE THAT APPLIES TO ALL ALTERNATIVES**

The following stipulations and conditions would apply to new leases issued in the resource area under all alternatives. These conditions would also be applied to new operations on existing leases as conditions of approval for Applications for Permit to Drill (APD) or geophysical exploration permits.

#### **Measures to Protect Threatened, Endangered, and Other Special Status Species**

A) **BLM Standard Lease Stipulations (BLM Form 3100-11).**

These provisions require the operator to minimize impacts to biological resources, take reasonable measures required by the BLM to protect resources, conduct minor inventories or short term special studies, contact the BLM if threatened or endangered species are observed, and cease operations that would result in the destruction of threatened or endangered species. Reasonable measures are defined in 43 Code of Federal Regulations 3101.1-2 as consistent with lease rights if, at a minimum, they do not require relocation of operations more than 200 meters, require siting of facilities off the lease, or prohibit surface disturbing operations more than 60 days in any lease year.

B) **Prior to authorization of any surface disturbing activity a review of existing ecological data would be conducted to determine if any threatened, endangered or other special status species may exist on the proposed site. If this review**



indicates species of concern may occur on the site, then a site-specific field examination would be conducted during the appropriate season to determine if the species occupies the site. Field surveys would be conducted by qualified botanists following standards established by the California Department of Fish and Game (1984) and the California Native Plant Society (Nelson 1987). If species occur, then all surface disturbing activity would be moved up to 200 meters and/or prohibited for up to 60 days in any lease year to avoid adverse impacts to the species. If movement of the site this distance or these seasonal restrictions were insufficient to avoid impacts, then additional mitigation measures would be developed in conjunction with consultations with the U.S. Fish & Wildlife Service per Section 7 of the Endangered Species Act.

- C) Specialized habitats such as riparian areas, vernal pools, native perennial grasses, saltbush, and oak woodlands would be avoided by surface disturbing activities when practical and feasible alternatives exist.
- C) Measures included in the Panoche/Coalinga Area of Critical Environmental Concern (ACEC) Plan (USDI 1987) to mitigate oil and gas exploration and development activities would be implemented in all areas within the resource area where potential or occupied habitat for these species occurs. These measures would also be applied to T&E plant habitat as appropriate. A copy of these measures is in Appendix C.
- D) A stipulation prohibiting surface occupancy within 1/2 mile of raptor nest sites during nesting and fledgling seasons would be placed on all leases that include known raptor nest sites. The seasonal prohibition could be waived if field examination indicated the nest site was not being used.

#### **Measures to Protect Scenic Quality (Visual Resources)**

- A) BLM Standard Lease Stipulations (BLM Form 3100-11).

The operator is required to take reasonable measures to minimize impacts to visual resources. Reasonable measures are defined in 43 Code of Federal Regulations 3101.1-2 to include, but are not limited to, modification of design or siting of facilities, and relocation of proposed operations by up to 200 meters.

#### **Measures to Protect Water Quality**

- A) BLM Standard Lease Stipulations (BLM Form 3100-11).

The operator is required to take reasonable measures to minimize impacts to land, air and water resources. Such measures include, but are not limited to, specifications of interim and final reclamation measures.

- B) Standards and guidelines in the Surface Operating Standards for Oil and Gas Exploration and Development (RMRCC 1989) would be applied to all oil and gas exploration and development activities. These are interagency guidelines developed to provide design and construction techniques and other practices that would minimize surface disturbance, effects on other resources, and maintain reclamation potential of lease sites.
- C) Proposed oil and gas development proposals (pad/access road construction, vegetation removal, etc.) on slopes that exceed 10%, within the Clear Creek Area of Critical Environmental Concern (ACEC), or within the selenium-bearing Moreno shale formation would require submission of designs prepared by a licensed professional engineer, incorporating adequate mitigation measures to preclude slope failure or off-site transport of sediments and detailing reclamation procedures that would result in successful restoration and revegetation of the site.

### **Measures to Protect Cultural Resources**

- A) BLM Standard Lease Stipulations (BLM Form 3100-11).

The operator is required to minimize impacts to cultural resources, take reasonable measures required by the BLM to protect resources, conduct minor inventories or short term special studies, contact the BLM if objects of historic or scientific interest are observed, and cease operations that would result in destruction of historic objects. Reasonable measures are defined in 43 Code of Federal Regulations 3101.1-2 as consistent with lease rights if, at a minimum, they do not require relocation of operations more than 200 meters or require siting of facilities off the lease.

- B) A cultural resource inventory would be required prior to authorization of any surface disturbing activity. Proposed activities would be moved up to 200 meter to avoid adverse impacts to all potentially significant archaeological sites. For sites that could not be avoided, an appropriate data recovery plan would be developed in consultation with the State Historic Preservation Officer and the National Advisory Council on Historic Preservation. Implementation of the data recovery plan would be a condition of approval of the proposed activity.

### **Measures to Protect Air Quality**

- A) All oil & gas exploration and development activities that require off-road vehicle use or surface disturbance would be required to obtain an air quality emission permit or verification that such permits are not appropriate from the regional air quality control board.



- B) All oil & gas exploration and development activities would be required to employ all Best Available Control Technology (BACT) to minimize air emissions.
- C) All Applications For Permits to Drill (APD) would be required to provide an analysis of the potential for use of gas or electric motors in lieu of diesel-powered drill rigs and pumpjacks.
- D) All oil & gas exploration and development activities resulting in surface disturbance or requiring the use of motorized vehicles would be required to suppress fugitive dust emissions from paved and unpaved surfaces in accordance with local APCD regulations.

## **ALTERNATIVE "A" - CURRENT MANAGEMENT (Map #3)**

**Acres Open Subject to Standard Terms and Conditions: 652,660**

**Acres Open Subject to Seasonal or Other Minor Constraints: 18,940**  
**Raptor Nesting Areas = 18,940**

**Acres Open Subject to No Surface Occupancy & Other Major Constraints: 0**

**Acres Closed to Leasing: 23,400**  
**Coastal Zone, Squaw Leap, Monterey Peninsula watershed = 23,400**

This alternative is a continuation of current management practices subject to the above stipulations and conditions. All areas with potential for discovery of oil & gas would be available for leasing. This would include approximately 280,668 acres of public land and 367,100 acres of private land with federal mineral ownership. Approximately 5,500 acres of public land and 17,900 acres of private land with federal mineral ownership would not be available for leasing. Areas not available for leasing would include the Squaw Leap Management Area (critical watershed values and winter habitat for bald eagles), the California Coastal Zone (high sensitivity watershed), and the Monterey Peninsula watershed (critical watershed values). BLM studies indicate these areas that would be closed to leasing have no oil & gas potential (Milliken 1990a & 1990c). The only special stipulation would be a seasonal restriction on surface occupancy within 1/2 mile of occupied raptor nests. This would affect leases on up to 11,200 acres of public land and 7,740 acres of private land with federal mineral ownership. Leasing would also not occur on about 23,782 acres that are currently being considered for wilderness designation. Leasing could occur on these lands following a Congressional determination that they are not suitable for wilderness designation.



## **ALTERNATIVE "B" - NO O&G LEASING**

**Acres Open Subject to Standard Terms and Conditions: 0**

**Acres Open Subject to Seasonal or Other Minor Constraints: 0**

**Acres Open Subject to No Surface Occupancy & Other Major Constraints: 0**

**Acres Closed to Leasing: 695,000**

Under this alternative no new leases would be issued for oil & gas exploration and development on public lands in the resource area. While it is the policy of the Bureau to make public lands available for development of oil & gas leasing where compatible with other resource values and environmental concerns, this alternative is included to provide a baseline for evaluation of the environmental impacts of the federal oil and gas leasing program.

Oil & gas exploration and development activities, however, would continue in areas that are currently leased. Existing leases currently producing oil or gas would remain in effect until production ceased.

## **ALTERNATIVE "C" - NSO ON T&E PLANT POPULATIONS/PINNACLES VIEWSHED (Map #4)**

**Acres Open Subject to Standard Terms and Conditions: 644,700**

**Acres Open Subject to Seasonal or Other Minor Constraints: 18,940**  
**Raptor Nesting Areas = 18,940**

**Acres Open Subject to No Surface Occupancy & Other Major Constraints: 7,960**  
**Pinnacles Viewshed = 4,120**  
**T&E Plant Populations = 3,840**

**Acres Closed to Leasing: 23,400**  
**Coastal Zone, Squaw Leap, Monterey Peninsula watershed = 23,400**

Acreage offered for leasing would be the same as in the Current Management Alternative (Alternative "A") except that on approximately 7,480 acres of public land and 480 acres of private land with federal mineral ownership, leases would be issued with a No Surface Occupancy (NSO) stipulation. An NSO stipulation allows land to be leased but does not authorize any surface use on the portion of the lease governed by the NSO stipulation. The following areas would be subject to the NSO stipulation:

- A) Approximately 3,840 acres of public land where populations of the California jewelflower, San Joaquin woolly-threads, or Hoover's woolly-star were found during botanical inventories conducted in 1991. There would be a provision for a waiver of the NSO following completion of more comprehensive botanical inventories to determine the full extent of the populations and analysis to determine if proposed operations could avoid damage to the plant species. Most of these parcels are located adjacent to producing oil fields in the Coalinga area where the oil & gas potential is considered high (Milliken 1990a).

Botanical inventories would adhere to the following procedures:

- 1) The previously discovered populations would be examined to confirm that the inventory is being conducted during a season and year when the species are detectible. If these known populations are not detectible, then the survey would be deferred until an appropriate season and year when the species are detectible.
  - 2) Inventories would be conducted by qualified botanists following standards established by the California Department of Fish and Game (1984) and the California Native Plant Society (Nelson 1988). All areas potentially impacted directly or indirectly by the proposed action would be inventoried.
  - 3) The NSO provision would only be waived for those portions of the lease where inventories have been completed and it has been determined that the proposed occupancy would not have an adverse impact on the species.
- B) Approximately 3,640 acres of public land and 480 acres of private land with federal mineral ownership within the foreground viewshed of Pinnacles National Monument. There would be no provision for a waiver of this NSO. The areas where this restriction would apply have been determined to have moderate or no oil & gas potential.
- C) Seasonal surface occupancy restrictions to protect nesting raptors would also be applied in this alternative.



## **ALTERNATIVE "D" - NSO ON T&E PLANT HABITAT/PINNACLES VIEWSHED (Map #5) (Preferred Alternative)**

**Acres Open Subject to Standard Terms and Conditions: 476,540**

**Acres Open Subject to Seasonal or Other Minor Constraints: 18,940**  
**Raptor Nesting Areas = 18,940**

**Acres Open Subject to No Surface Occupancy & Other Major Constraints: 176,120**  
**Pinnacles Viewshed = 4,120**  
**T&E Plant Populations = 3,840**  
**T&E Plant Habitat = 168,160**

**Acres Closed to Leasing: 23,400**  
**Coastal Zone, Squaw Leap, Monterey Peninsula watershed = 23,400**

Acreage offered for leasing would be the same as Alternative "C" - NSO On Plant Populations/Pinnacles Viewshed Alternative. The conditional NSO however would apply to an additional 83,160 acres of public land and 85,000 acres of private land with federal mineral ownership. These additional areas that would be subject to the conditional NSO are potential habitat for the California jewelflower, San Joaquin woolly-threads, or Hoover's woolly-star that have not been inventoried to determine if the plants are present. Inventory procedures would be the same as described under the previous alternative.

## **ALTERNATIVE "E" - NO LEASING IN T&E ANIMAL HABITAT (Map #6)**

**Acres Open Subject to Standard Terms and Conditions: 476,540**

**Acres Open Subject to Seasonal or Other Minor Constraints: 18,940**  
**Raptor Nesting Areas = 18,940**

**Acres Open Subject to No Surface Occupancy & Other Major Constraints: 70,020**  
**Pinnacles Viewshed = 4,120**  
**T&E Plant Habitat (outside T&E animal habitat) = 65,900**

**Acres Closed to Leasing: 129,500**



**Coastal Zone, Squaw Leap, Monterey Peninsula watershed = 23,400**  
**T&E Animal Habitat Outside Oil Fields = 106,100**

Habitat for endangered or threatened animal species (San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat) would not be leased except within established oil & gas fields. This closure would apply to 64,500 acres of public land and 41,600 acres of private land with federal mineral ownership. Most of the areas that would be closed to leasing are on the east side of the Diablo Range foothills just west of I-5. As in the Current Management Alternative (Alternative "A"), there would also be no leasing in the Squaw Leap Management Area, the California Coastal Zone, or the Monterey Peninsula watershed. The NSO provisions described in the NSO On T&E Populations/Pinnacles Viewshed Alternative (Alternative "D") would also apply to this alternative.

The application of these restrictions would result in 216,168 acres of federal land and 325,500 acres of private land with federal mineral ownership being available for oil & gas leasing. The NSO to protect potential and known T&E plant habitat would apply to about 22,500 acres of public land and about 43,400 acres of private land with federal mineral ownership. These are areas containing potential T&E plant habitat that are outside the boundaries of the T&E animal habitat or are within the developed oil fields. The NSO to preserve visual quality in the Pinnacles National Monument viewshed would apply to an additional 3,800 acres of public land and 300 acres of private land with federal mineral ownership.

## **ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS**

Additional alternatives were considered for detailed evaluation. An alternative was considered that would have allowed oil & gas leasing in the Squaw Leap Management Area, the California Coastal Zone, and the Monterey Peninsula watershed. This alternative was not selected for detailed analysis because these areas are all environmentally sensitive and have no oil & gas potential. There has been no industry interest or past leasing activity in these areas. Alternatives that would allow O&G operations to be conducted with fewer restrictions than allowed under current management were also considered. These alternatives were not selected for detailed analysis because the management guidance that applies to all alternatives, which is described at the beginning of this chapter, are all considered practical and feasible requirements to avoid environmental impacts and/or degradation of the public lands. It is the policy of the BLM to apply all reasonable measures to avoid any unnecessary environmental impacts resulting from oil and gas operations on public lands. The Federal Land Policy and Management Act of 1976 requires the BLM to avoid any unnecessary or undue degradation of public lands.

Alternatives with No Surface Occupancy (NSO) restrictions were considered only for relatively small acreage or when provisions for a waiver of the NSO could be considered. This is to avoid the use of the NSO stipulation as a de facto "No Leasing" decision.

An alternative to consider not leasing T&E habitat within the developed oil and gas fields was considered but was not included for detailed analysis. These areas are already under lease and are expected to remain under lease for the life of this plan. The impacts of this alternative would be the same as in the No Leasing in T&E Animal Habitat Alternative (Alternative "E").

## **SELECTION OF THE PREFERRED ALTERNATIVE**

The BLM's Preferred Alternative is the NSO On T&E Plant Habitat/Pinnacles Viewshed Alternative (Alternative "D") which would be subject to the stipulations and conditions described at the beginning of this chapter, and subject to the additional mitigation measures described below. This alternative has been selected because it would allow for continued exploratory drilling and hold open the opportunity for the discovery of new oil & gas resources on public lands, while also providing for all practical measures to minimize or eliminate environmental impacts. This alternative would be implemented in the following manner:

- A) 182,688 acres of public land and 273,880 acres of private lands with federal mineral ownership would be available for leasing subject to the standard lease terms. Information Notices would be attached to leases in the following areas to notify lessees that special restrictions may apply to any proposed actions on the leases:
  - 1) All Leases - (air quality mitigation)
  - 2) All Leases - (cultural resources mitigation)
  - 3) T&E Animal Habitat - (RTE ACEC restrictions)
  - 4) T&E Plant Habitat - (T&E Plant restrictions)
  - 5) I-5 Viewshed - (visual resource mitigation)
  - 6) Pinnacles Mgmt Area - (air quality mitigation)
  - 7) Slopes Above 10% - (Watershed/erosion mitigation)
  - 8) Clear Creek Mgmt Area - (Watershed/erosion mitigation)
  - 9) Moreno Shale Formation - (Watershed/erosion mitigation)
- B) About 11,200 acres of public lands and 7,740 acres of private land with federal mineral ownership would be available for leasing subject to a stipulation prohibiting surface occupancy within 1/2 mile of raptor nests during nesting and fledgling seasons. There would be a provision to waive this stipulation if field



examination indicated the nest site was not being used during seasons of normal occupancy.

- C) 83,160 acres of public land and 85,000 acres of private land with federal mineral ownership would be available for leasing subject to a "conditional" No Surface Occupancy (NSO) stipulation. These areas are potential T&E plant habitat. The stipulation could be waived following botanical inventories and verification that the plants could be avoided during proposed surface activities. Botanical inventory procedures would be as described under the NSO On T&E Plant Populations/ Pinnacles Viewshed Alternative (Alternative "C").
- D) 3,800 acres of public lands and 360 of private land with federal mineral ownership within the foreground viewshed of Pinnacles National Monument would be available for leasing with a No Surface Occupancy (NSO) stipulation. There would be no provision for waiving this NSO.
- E) 5,500 acres of public lands and 17,900 acres of private land would not be available for O&G leasing. These areas are the Squaw Leap Management Area, the California Coastal Zone, and the Monterey Peninsula watershed.
- F) 23,782 acres currently under wilderness review would not be available for leasing at this time. Leasing could occur on these lands following a Congressional determination that they are not suitable for wilderness designation. (Note: If the 2,200 acres in the Pinnacles watershed on the monument's north boundary is not designated wilderness, it would be leased subject to the NSO restriction that applies under (D) above.).

### Additional Mitigation Measures

- A) Air modelling studies would be required before any emissions are allowed on leases in the Pinnacles Management Area. If studies indicate Pinnacles National Monument air quality would be impacted, then the use of electric motors or other non-polluting technology would be required to minimize emissions.
- B) Destruction of potential T&E plant habitat would require acquisition and transfer to the BLM of comparable off-site habitat.
- C) Exploratory drilling in T&E plant or animal habitat would be required to use self-contained units to eliminate the need for sumps and to minimize spillage.
- D) Development of new O&G fields in T&E animal habitat would be limited to one pad per 40 acres.

- E) Exploratory wells would be moved at least 200 meters from wildlife water sources.
- F) Off-site mitigation would be required if development activities in newly discovered fields results in loss of Santa Lucia deer herd habitat.
- G) Wherever practical and consistent with other objectives, abandonment procedures would attempt to restore native vegetation and natural appearing contours.
- H) Where site-specific evaluation indicates exploratory well sites would be valuable wildlife water sources, conditions would be applied requiring operators to provide the BLM with the option to develop unsuccessful wells for wildlife water. Priority for allocation of new water sources would be to enhance wildlife habitat.
- I) Site-specific conditions for well abandonment operations with T&E animal or plant habitat would give priority to maintaining and/or establishing habitat for these species.
- J) Within blunt-nosed leopard lizard and San Joaquin antelope ground squirrel habitat, road berms would be avoided during road maintenance and construction with burrows hand excavated to allow animals to escape prior to destruction of the berms.
- K) Wherever practical, access roads would be constructed on slopes not visible from the major road corridors.
- L) Except within the intensively developed areas of existing oil fields, all new facilities on federal leases would be painted to blend in with the surrounding natural landscape.

## **Residual Impacts**

- A) There would in increased emissions of ROGs, nitrogen oxides, and particulates. Emissions generated would be additive to the Air Quality Standards already being exceeded in the San Joaquin Valley Air Quality Basin.
- B) There could be a loss of possible populations of the endangered San Joaquin woolly-threads and California jewelflower, the threatened Hoover's woolly-star, and the hollisteria on existing leases in the Jacalitos and Kettleman North Dome oil fields. Exploration and development in chaparral habitats could also result in the loss of possible populations of the one-awned spineflower.



- C) There could be loss of some populations of the endangered San Joaquin kit fox and the blunt-nosed leopard lizard as a result of continued development in the Coalinga oil fields.

### **Monitoring**

- A) Annual monitoring would be implemented per the guidelines in Table #1.
- B) A moratorium would be placed on leasing within affected areas if the environmental assessment prompted by the monitoring plan indicates that unanticipated significant impacts could result from continuation of the leasing program. The moratorium would remain in effect until a new Environmental Impact Statement was completed.

**TABLE #1**  
**MONITORING PLAN**  
**HOLLISTER OIL & GAS PLAN AMENDMENT/EIS**

ENVIRONMENTAL ELEMENT	ITEM MONITORED	THRESHOLD	ACTION IF THRESHOLD IS EXCEEDED
AIR QUALITY	# of exploratory wells # of new producing wells # of wells abandoned total new annual emissions	net increase of 20 wells in San Joaquin basin, or net increase of five wells in N. Central Coast basin, or new emissions = 80% of emissions forecast for a basin	complete new environmental analysis & consult with appropriate air quality control board
SPECIAL STATUS PLANTS	annual inventory of known T&E locations in or near existing or future oil activities following CNPS procedures	any damage to occupied habitats or reduction in population size attributable to human disturbance	develop new mitigation measures to preclude additional damage
	# of acres of habitat disturbed	acres impacted exceeds 400 acres	complete new environmental assessment and consult with USF&WS
SPECIAL STATUS ANIMALS	annual monitoring of T&E species in or near existing or future oil activities following ACEC procedures	any damage to burrows, or reduction in population size attributable to human disturbance	develop new mitigation measures to preclude additional damage
	# of acres of habitat disturbed	acres impacted exceeds 400 acres	complete new environmental assessment and consult with USF&WS
VISUAL RESOURCES	visually impacted acres visible from I-5	acres impacted exceeds 120 acres	complete new environmental assessment
WILDLIFE	acres of upland game or Santa Lucia deer habitat disturbed	acres impacted exceeds 40 acres for either deer or upland game	complete new environmental assessment
WATER QUALITY & EROSION	total acres disturbed	acres disturbed (- acres successfully rehabilitated) exceeds 400 acres	complete new environmental assessment
OIL & GAS RESOURCES	price & demand for oil	15% or greater increase in price or demand over two year period	complete new environmental assessment

**Note:** Thresholds for actions have generally been set at 80% of impacts anticipated in the EIS. This allows for sufficient lag time to allow completion of new environmental assessments before impacts in excess of those anticipated in the EIS occur.



**TABLE #2**  
**SUMMARY OF ENVIRONMENTAL IMPACTS**

RESOURCES	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E
Air Quality	Increased emissions of ROGs, NOX, & PM-10 in San Joaquin and North Central Air Basins; failure to meet federal air emission standards in Fresno County; BLM contribution probably insignificant.	Increased emissions of ROGs, NOX, and PM-10 in San Joaquin Air Basin, reduced emissions in North Central Air Basin; failure to meet federal air emission standards in Fresno County; BLM contribution probably insignificant.	Impacts would be the same as in Alternative A	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.
Special Status Plant Species	Possible loss of populations of three T&E species in developed oil fields, and from new exploratory wells in occupied and potential habitat. Loss of populations could threaten survival of some species.	Possible loss of populations of three T&E species in developed oil fields. Loss of populations could threaten survival of some species.	Possible loss of populations of three T&E species in developed oil fields, and from new exploratory wells in potential habitat. Loss of populations could threaten survival of some species.	Impacts would be the same as in Alternative B.	Impacts would be the same as in Alternative B.
Special Status Animal Species	Potential loss of 505 acres of habitat and temporary disturbance of 485 acres of habitat for five T&E species; probable incidental take of some individuals. Could result in loss of populations of San Joaquin kit fox and bluntnosed leopard lizard.	Potential loss of 450 acres of habitat and temporary disturbance of 335 acres of habitat for five T&E species; probable incidental take of some individuals. Could result in loss of populations of San Joaquin kit fox and bluntnosed leopard lizard.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative B.
Wildlife	Displacement of upland game species from some habitat areas; potential loss of 55 acres of habitat for the Santa Lucia deer herd. Possible development of new water sources for wildlife.	Displacement of upland game species from some habitat areas.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.	Impacts would be similar to Alternative A.

Water Quality & Erosion	Increased erosion from long-term disturbance of soils & vegetation on 505 acres and temporary disturbance on 150 acres. Possible oil spill affecting Silver Cr water quality. No impact to groundwater.	Increased erosion from long-term disturbance of soils & vegetation on 450 acres and temporary disturbance on 140 acres. Possible oil spill affecting Silver Cr water quality. No impact to groundwater.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.
Visual Resources	Potential loss of scenic quality on about 160 acres in viewshed of I-5; potential degradation of scenic quality in viewshed of Pinnacles National Monument.	No impacts to visual quality are anticipated.	Potential loss of visual quality on about 160 acres in the viewshed of I-5.	Impacts would be the same as in Alternative C.	No impacts to visual quality are anticipated.
Oil & Gas Resources	Less than 5% chance for discovery of oil & gas field with up to 1,000,000 barrels of oil. Increase in production is insignificant compared to existing producing fields in region and in California. No significant impact to local or regional economies.	Opportunity for discovery of new O&G field would be foregone. Loss production would be insignificant. Even when cumulative impacts are considered, would have no impact on trend toward increased reliance on foreign imports.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.	Impacts would be the same as in Alternative A.



# **CHAPTER THREE**

## **AFFECTED ENVIRONMENT**

### **INTRODUCTION**

The chapter describes those portions of the environment that could be affected by the federal oil & gas leasing program in the Hollister Resource Area. Emphasis has been placed on environmental issues identified during the public scoping process. The Hollister Resource Area includes three designated Areas of Critical Environmental Concern (ACEC). The Clear Creek Serpentine ACEC would not be affected by the oil & gas leasing program because the area has no potential for oil & gas resources. Standard mitigation measures incorporated in the Panoche/Coalinga ACEC Management Plan are also expected to preclude any impact to paleontological resources protected by the Panoche/Coalinga Paleontological ACEC. Potential impacts to special values within the Panoche/Coalinga RTE ACEC are discussed in the threatened, endangered, and special status plant and animal portions of this chapter. Hazardous material concerns are discussed under Water Quality/Groundwater. There are no Wild & Scenic Rivers in the resource area.

With implementation of standard mitigation terms and the management guidance that applies to all alternatives, the following resources are not expected to be affected by the oil & gas leasing program: Native American religious concerns, wetlands, floodplains, farmlands, recreation, cultural & paleontological resources, and livestock grazing.

### **AIR QUALITY**

For purposes of monitoring and regulating air quality, the state of California has been divided into thirteen air basins. The five counties in the Hollister Resource Area are in portions of two of these air basins. Fresno, Merced and Madera counties are in the San Joaquin Valley Air Basin along with the counties of San Joaquin, Stanislaus, Kings, Tulare, and Kern. San Benito and Monterey counties are in the North Central Coast Air Basin which also includes Santa Cruz County.

Ambient air quality standards have been established by both federal and state legislation for a variety of air pollutants. National "primary" standards represent thresholds which result in known impacts to human health when they are exceeded. National "secondary" air quality standards define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. For example, degradation of materials such

as rubber, paint and plastics, reduced visibility, soiling effects, and the economic, ecologic and aesthetic damage that can occur to plants.

More stringent standards have also been established for maintaining air quality in designated wilderness areas. Pinnacles National Monument and the Ventana Wilderness have been designated Class I air quality areas by the California Air Resources Board. For Class I areas the Clean Air Act requires special management to control total suspected particulates and sulfur oxide emissions, and prevention of significant deterioration of existing natural and visually aesthetic qualities (MBUAPCD 1989).

In addition to ambient air quality standards, the State of California has begun to implement a long term program to identify, assess and control ambient levels of hazardous air pollutants. This program was initiated by passage of the Air Toxics "Hot Spots" Information and Assessment Act of 1987. As the name implies, "hot spots" are localized point source emissions of air toxics generated by both large and small industrial operations such as mining, oil & gas, manufacturing and processing. This Act is in accordance with Title III of the Clear Air Act as amended in 1990. The regulation specifies National Emission Standards for Hazardous Air Pollutants (NESHAPS) that set limits on emissions of especially harmful air pollutants. Air toxic hot spot violations are monitored and regulated by the local Air Quality Control Districts.

Oil and gas exploration/development generates several pollutants which can have a negative impact on air quality. The principle pollutants emitted by oil and gas activities are 1) carbon monoxide, 2) fine particulate matter (PM-10), 3) reactive organic gases (ROGs), 4) nitrogen oxides, and 6) sulfur oxide (USDA 1983). Emissions of reactive organic gases and nitrogen oxides result in the photochemical production of ozone, one of the principle components of smog.

## **SAN JOAQUIN VALLEY AIR BASIN**

At the present time air quality is managed by San Joaquin Valley Air Quality Basin Authority. Most of the data in this analysis was developed by the Fresno County Air Pollution Control District.

Fresno County currently exceeds both federal and California ambient air quality standards for ozone, carbon monoxide, and PM-10. Air quality is a severe problem in Fresno County with air quality worse than many larger metropolitan areas such as New York or Chicago (CARB 1988).

During 1989 federal ozone standards were exceeded on 24 days while California ambient ozone standards were exceeded on 109 days. Ambient ozone concentrations were as high as 42% above the federal standard. Federal PM-10 standards were exceeded on seven days while the more stringent California standards were exceeded on 39 separate days. Federal and California carbon monoxide standards were exceeded on 17 days (FAQCB 1989).



The petroleum industry has been identified as one of the major sources of ozone generating compounds within Fresno County. Oil & gas production and processing activities are estimated to generate about 15% of the ROGs and about 10% of the nitrogen oxide emitted in the county (CARB 1988). The industry is not considered a significant contributor to carbon monoxide or PM-10 emissions. There are about 4,485 producing oil & gas wells in Fresno County with about 110 or 2.5% on federal leases. Oil operations on federal leases therefore are probably responsible for less than 1% of total emissions or 0.37% of the ROGs and about 0.25% of the nitrogen oxide emissions in the county.

The prognosis for improvement of total air quality in Fresno County is not good. Despite reductions in the emissions of reactive organic gases, ozone concentrations have been increasing in severity. The Air Resources Board is currently projecting a 7% increase in ROGs and a 4% increase in nitrogen oxides by the year 2000. BLM's contribution to the increase is projected to be negligible. Attainment of federal air quality standards for ozone is not anticipated by 2005 (CARB 1988).

## **NORTH CENTRAL COAST AIR BASIN**

Air quality within the North Central Coast Air Basin is managed by the Monterey Bay Unified Air Pollution Control District. This District includes Monterey, Santa Cruz, and San Benito Counties. The basin currently exceeds federal ambient air quality standards for ozone, and exceeds California ambient air quality standards for ozone and fine particulate matter (PM-10). Violations of the federal ozone standards were recorded on eight separate days in Pinnacles National Monument during 1987. Violations of the California ozone standards were recorded on 50 separate days totalling 177 hours. No violations of the federal standards for PM-10 have been recorded, however violations of the more stringent California standard were recorded on eight occasions in 1987 and four times in 1988 (MBUAPCD 1989).

Oil & gas production & processing activities are estimated to generate about 1% of the ROGs, about 5% of the nitrogen oxides, and about 1% of the fine particulate matter emitted in the basin. By contrast motorized vehicles currently account for 36% of the ROGs and 50% of the nitrogen oxide emissions in the basin (MBUAPCD 1989).

There are currently approximately 1,454 producing oil wells in the North Central Coast Air Basin. Only 18, or about 1.3% of these wells are located on federal leases. By extrapolation, it is anticipated that oil & gas facilities on federal leases are currently contributing a negligible amount (.015% of the ROGs, .075% of the nitrogen oxide, and .015% of the fine particulate matter) of these pollutants emitted in the basin.

The 1989 Air Quality Management Plan for the Monterey Bay Region anticipates that the region will be able to meet federal ambient air quality standards for ozone by 2005 (MBUAPCD 1989).



## VEGETATION

Public lands within the Hollister Resource Area are primarily dominated by four vegetation types; chaparral, annual grassland, half-shrub, and oak woodlands.

Oak woodlands are of particular concern because of the rapid loss of oaks in urban-range environments (USFS 1980) and due to the possibility that existing oak woodlands may be in decline due to poor regeneration (BLM 1990). Oaks are estimated to grow on about 15 to 20 million acres in California (Callaham 1979) and it is estimated that over one million acres have been lost since 1945 due to agricultural conversion and urban encroachment (BLM 1990).

In addition to oak woodlands, a small percentage of public lands within the Hollister Resource Area support other plant communities of concern that could be affected by future oil and gas development. These include saltbush scrub, riparian and wetland vegetation, desert disjunct sand dune communities and stands of native perennial grasses.

Over 90 % of saltbush scrub in the San Joaquin Valley region has been eliminated, primarily by conversion to agricultural lands, urban and rural development, and the development of oil and gas fields.

A large percentage of riparian (such as drainages which have broad-leaved vegetation and which have seasonal flows) and wetland habitat (i.e. springs and vernal pools) have also been lost or degraded (such as by the invasion of aggressive introduced plant species) by development pressures and because of intensive livestock grazing.

Desert sand dune communities occur in the Ciervo Hills and along Monocline Ridge in the western foothills of the San Joaquin Valley in Fresno County. These communities, which represent isolated pockets of habitat otherwise found in the Mojave Desert, are currently threatened by the invasion of aggressive weeds such as tumbleweed (*Salsola iberica*) and by trespass off-road vehicle use.

Native perennial (long-lived) grasslands are estimated to have originally covered 33% of California and much of the San Joaquin Valley region. The same grasses are currently estimated to cover 1% of California (Lowry 1991). Perennial grasses have been largely replaced by European annual (short-lived) grasslands.

During the 15 year life of this plan there is a projected total of 17,000 acres of vegetation which is expected to be affected by oil and gas development operations (see Table 9). This includes approximately 500 acres of vegetation on public lands and 3,400 acres of vegetation on private lands which will be temporarily disturbed by such activities as exploratory drilling, seismic exploration, and temporary roads to unsuccessful wells. The 17,000 acre projection also includes the long-term disturbance of approximately 500 acres of public lands and 12,600 acres of private lands by the construction of facilities such as long-term roads, well pads, and tank farms.



The majority of the 1,000 acres of public lands projected to be disturbed by oil and gas activities are in the Coalinga and East Coalinga Oil Fields. Annual grassland and saltbush scrub were the likely dominant plant communities when these oil fields were established and these two plant communities would be the most affected by additional surface disturbance in these areas.

Most of the 16,000 acres of private lands in the Hollister Resource Area projected for surface disturbance related to oil and gas development are in the San Joaquin Valley east of Interstate 5. There are no public lands in this area and about 4000 acres of private lands with federal mineral rights. Saltbush scrub and annual grasslands are also the two dominant plant communities on these lands.

Affected threatened, endangered, and other special status plants are discussed under a separate heading below.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANTS**

There are one-hundred and one plant species in the Hollister Resource Area that are either federally listed as endangered or threatened, or are otherwise designated by BLM as having special status (Special status designations are described in the footnote to Appendix D). Nine of these are known to occur on some of the public lands within the Hollister Resource Area which are likely to be subject to future oil and gas development. Their names, status, habitat needs, and areas of concern relative to this EIS are listed in Table 3. Additional information for each of these nine species is also provided below. Three special status plant species have a moderate potential of occurring on public lands in the Hollister Resource Area where foreseeable oil and gas development may occur. These are listed along with their status and habitat in Table 4. The remaining 89 plant species which have special status and occur in the Hollister Resource Area have a low potential of being affected by foreseeable oil and gas development and are listed in Appendix D.

In 1991, inventories for special status plant species were conducted on most public lands within existing oil fields and in areas with high oil and gas potential in the Hollister Resource Area. A summary of these results is provided below.

Most public lands and many of the private lands in the Coalinga and East Coalinga Oil Fields were inventoried by BLM staff and Fresno State University staff (John Stebbins personal communication, 9/27/91). The forked-fiddleneck (*Amsinckia furcata*) was the only special status plant species encountered in these fields. Long-term and severe surface disturbance related to oil and gas operations has occurred in these oil fields and this disturbance has resulted in degraded habitat quality and the establishment of introduced, weedy plant species. It is unlikely that continued development in these two oil fields would affect any existing populations of

special status plant species other than the forked-fiddleneck. These fields are also considered to have very poor quality site conditions for the reestablishment of local special status plant species.

Inventories conducted on much of the federal and private lands in the Jacalitos Hills and North Kettleman Dome Fields recorded the occurrence of four special status plant species (Lembertia congdonii, Eriastrum hooveri, Hollisteria lanata, and Amsinckia furcata). Both the Jacalitos Hills and the Kettleman Hills, though moderately to heavily disturbed by past and current oil and gas operations, appear to be good candidates for recovery areas for these species since they are already occupied and have a larger component of native habitat than adjacent areas which also contain public lands.

Inventories in the Kreyenhagen Hills resulted in the discovery of a new population area of Caulanthus californicus. The Kreyenhagen Ranch, which contains 40,000 acres of the Kreyenhagen Hills, has not been developed by oil and gas operations and has been moderately impacted by livestock grazing. Nineteen ninety-one was a very productive year on this ranch for native forbs and there appears to be substantial habitat and potential for additional C. californicus populations.

Inventories in the Vallecitos Oil Field and the adjacent valley and uplands recorded the occurrence of three special status plant species (Lepidium jaredii ssp. album, Hollisteria lanata, and Amsinckia furcata). Though there was apparently sufficient rain to support other special status species such as Lembertia congdonii, none were found (Dean Taylor, personal communication 9/27/91). It is possible that habitat in the Vallecitos Valley area is not as suitable for these other species as the nearby Panoche drainage or the foothills closer to Coalinga.

Inventories were not conducted in the San Ardo oil fields. These fields contain 40 acres of BLM-administered lands.



**TABLE #3**  
**SPECIAL STATUS PLANT SPECIES THAT OCCUR IN AREAS IMPACTED BY**  
**O&G LEASE ACTIVITIES**

<u>SPECIES</u>	<u>FEDERAL</u> <u>STATUS</u>	<u>AREAS OF</u> <u>CONCERN</u>	<u>HABITAT</u>
California Jewelflower ( <u>Caulanthus californicus</u> )	E	Coalinga, Vallecitos	sandy soils in valley and foothill grass grasslands
Hoover's Woolly-star ( <u>Lembertia congdonii</u> )	T	Coalinga, Vallecitos	sandy soils in valley and foothill grasslands, saltbush scrub
San Joaquin Woolly-threads ( <u>Lembertia congdonii</u> )	E	Coalinga, Vallecitos	sandy soils in valley and foothill grasslands, saltbush scrub
Forked-fiddleneck ( <u>Amsinckia furcata</u> )	C2	Coalinga, Vallecitos	barren, talus or clay slopes in annual grasslands
One-awned Spineflower ( <u>Chorizanthe rectispina</u> )	C2	San Ardo	open, gravelly chaparral soils
Carmel Valley Bushmallow ( <u>Malacothamnus palmeri</u> <u>involucratus</u> )	C2	San Ardo	deep, chaparral soils
Hollisteria ( <u>Hollisteria lanata</u> )	C2	Coalinga Vallecitos	flat, open sandy or gra- velly slopes, annual grasslands
South Coast Range Morning Glory ( <u>Calystegia collina</u> <u>venusta</u> )	C2	Vallecitos	serpentine grassland
Jared's Peppergrass ( <u>Lepidium jaredii album</u> )	none	Coalinga Vallecitos	open, hard clay soils, foothill grasslands

TABLE #4  
SPECIAL STATUS PLANT SPECIES THAT COULD OCCUR IN AREAS  
IMPACTED BY O&G LEASE ACTIVITIES

<u>SPECIES</u>	<u>FEDERAL STATUS</u>	<u>AREAS OF CONCERN</u>	<u>HABITAT</u>
Oval-leaved Snapdragon ( <u>Antirrhinum ovatum</u> )	C2	Coalinga, Vallecitos, San Ardo	open, clay/ gypsum soils
Recurved Larkspur ( <u>Delphinium recurvatum</u> )	C2	Coalinga	moist, alkaline soils
Slender Pentachaeta ( <u>Pentachaeta exilis</u> <u>aeolica</u> )	C2	San Ardo, Vallecitos	grassy areas near 2000' elevation



## CALIFORNIA JEWELFLOWER - CAULANTHUS CALIFORNICUS

The California jewelflower was listed as Endangered by the California Dept. of Fish and Game in November 1986 and by the U.S. Fish and Wildlife Service in July 1990. Detailed information on the life-history and habitat of this species is reported by Taylor and Davilla, 1986.

The historic range of the California jewelflower was bounded by Coalinga and Fresno to the north, extended southwest through Cuyama Valley in Santa Barbara County, then east through Carrizo Plain in San Luis Obispo County, and on to Bakersfield in Kern County (BLM 1991). This historic range is known to have included approximately 60 populations of the California jewelflower. Today there are approximately 32 known populations remaining. All the San Joaquin Valley floor populations are now extirpated (with the exception of a reintroduced population at The Nature Conservancy's Paine Preserve) and virtually all of the San Joaquin Valley's habitat capable of supporting Caulanthus californicus has also been eliminated.

In addition to the introduced Paine Preserve population, only three areas are known to currently support Caulanthus californicus: 1) private lands in the Cuyama Valley (these populations are known to range from zero to several thousand individuals from year to year (Dean Taylor 1991, personal communication)), 2) BLM-administered lands in the Kreyenhagen Hills of Fresno County (these populations contained approximately 2,000 individuals in 1991 and extended over a 400-acre area(BLM-Hollister files)), and 3) the TNC/BLM administered lands in the Carrizo Plain. These three population areas are considered critical to the recovery of this species however it is quite possible that most of the optimal habitat for the California jewelflower was the valley floor habitat which has been eliminated and that remaining populations are in habitat which is of comparatively marginal quality for this species.

Loss of habitat and grazing (livestock appear to preferentially seek this species (USFWS 1991)) are the most significant threats to Caulanthus californicus. Soil compaction and competition from alien plant species may also adversely affect jewelflower populations(BLM 1991).

The Kreyenhagen Hills is the only one of the three California jewelflower population areas within the Hollister Resource Area. Soil at this location is a sandy, gravelly, loam and the vegetation is annual grassland and juniper(Juniperus californica)-grassland. This area is considered to have a high potential for oil and gas deposits (Milliken 1990a).

## SAN JOAQUIN WOOLLY-THREADS - LEMBERTIA CONGDONII

The San Joaquin woolly-threads was listed as Endangered by the U.S. Fish and Wildlife Service in July 1990. The California Dept. of Fish and Game has not given Lembertia congdonii any special status. Detailed information on the life-history and habitat of this species is reported by Taylor, 1989.



The historic range of the San Joaquin woolly-threads included the San Joaquin Valley floor from western Fresno County and eastern Tulare County south to the northern foothills of the Tehachapi Mountains. Its western range extended through the Carrizo Plain and on to Cuyama Valley in Santa Barbara County (BLM 1991). This historic range is known to have included at least 98 populations of the San Joaquin woolly-threads (Taylor 1989, BLM Hollister files). Today there are approximately 66 known populations remaining and nine historical L. congdonii locations where suitable habitat remains.

In the Hollister Resource Area there are ten known populations of the San Joaquin woolly-threads, four of which occur on BLM-administered lands and six of which occur on private lands (BLM-Hollister files). The majority of these populations (7) occur in the Jacalitos Hills and Kettleman Hills which contain 1,480 acres of BLM-administered lands. Both the Jacalitos and Kettleman Hills are considered to have a high potential for oil and gas reserves however they are not likely to have further oil and gas development during the next 15 years (Milliken 1990c). However abandonment and reclamation of existing production sites in these areas is expected to occur (see Impacts section for further discussion on potential impacts to special status plants from abandonment activities).

L. congdonii populations have a strong association with sandy soils and usually occur in annual grasslands or saltbush scrub which has not been recently disturbed. Over 90% of the saltbush scrub habitat in the western San Joaquin Valley and adjacent foothills has been eliminated (Taylor 1991, pers. communication).

Agricultural conversion is believed to be the cause of 90% of the eliminated L. congdonii populations (Taylor 1989). Other activities which severely alter the ground's surface such as construction of oil and gas facilities, or urbanization, are also likely to have eliminated San Joaquin woolly-thread populations. Less severe surface disturbing activities, such as livestock grazing and vehicle use during seismic exploration, could have adverse impacts to populations of this species by compacting the soil or crushing individual plants.

The most important biological threat to the San Joaquin woolly-threads appears to be competition from aggressive, European weeds and grasses that are adapted to livestock grazing and agriculture. Air pollution may also pose a threat to L. congdonii. At least one introduced species (Bromus rubens) has been shown to develop pollution-resistant traits which allows it to better compete with native annuals such as L. congdonii (Taylor 1989).

## **HOOVER'S WOOLLY-STAR - ERIASTRUM HOOVERI**

Hoover's woolly-star was listed as Threatened by the U.S. Fish and Wildlife Service in July 1990. The California Dept. of Fish and Game has not given Eriastrum hooveri any special status. Detailed information on the life-history and habitat of this species is reported by Taylor and Davilla, 1986.



The historic range of Hoover's woolly-star includes the western half of the San Joaquin Valley, the western foothills of Fresno and Kern Counties and as far west as the western Panoche Hills, San Benito County. The southern portion of this species' range also extends west into the Carrizo Plain and Cuyama Valley of San Luis Obispo and Santa Barbara Counties. This historic range is known to have included at least 120 populations of Hoover's woolly-star (Taylor 1986, BLM Caliente and Hollister Resource Area files). Today there are approximately 110 known populations remaining, 92 of which are in the Caliente Resource Area and 18 of which are in the Hollister Resource Area.

Two of the 18 known populations of Eriastrum hooveri in the Hollister Resource Area are on BLM-administered lands and these are found in sparsely-vegetated, saltbush scrub-grasslands, typical habitat for this species. Both of these populations are proposed for fencing to exclude livestock grazing and as much surface-disturbing activity as is feasible. In the Hollister Resource Area, oil and gas development is a significant threat since one of the resource area's two populations of E. hooveri on BLM-administered lands is in the Jacalitos Hills, an area with high oil and gas potential and currently under an oil lease. The effects of grazing on E. hooveri have not been studied but it is possible that hoof disturbance of soil crust may allow for denser growth of competing annuals which may compromise habitat quality for E. hooveri. This is supported by the presence of many E. hooveri populations growing on patches of cryptogamic soil crusts that support lower annual cover than surrounding areas (Taylor and Davilla, 1986).

## **HOLLISTERIA - HOLLISTERIA LANATA**

Hollisteria has been designated a Category 2 species as a candidate for listing as either threatened or endangered by the U.S. Fish and Wildlife Service. Hollisteria has not been given any special status by the California Dept. Fish and Game.

The historic distribution of hollisteria includes the lower elevations of the inner Coast Ranges and the low hills on the east side of the southern San Joaquin Valley. Some of Hollisteria's suitable habitat has been lost due to oil development, agriculture, and possibly overgrazing. Currently populations are known from Kern and Santa Barbara Counties north to Merced and Monterey Counties.

In Fresno County hollisteria is known to grow in Valley Grassland (at times alongside Lembertia congdonii and Eriastrum hooveri) and here its habitat (similar to that of the three listed species discussed above) appears to be pockets of reduced annual grass cover on dry, often barren, slopes of sandy or gravelly soils. Elsewhere in Fresno County hollisteria is known to occur on sandy ridgetops in the Kreyenhagen Hills and Joaquin Ridge, and on sandy benches above washes along Hwy 33. In San Benito County hollisteria occurs on gravelly substrate around washes and roadsides near Mercey Hot Springs, and in southern Monterey County it is found on gravelly serpentine grasslands around Turkey Flat. Extensive habitat remains for hollisteria in the Hollister Resource Area and future surveys for this species may record many more additional populations.



## **FORKED-FIDDLENECK - AMSINCKIA FURCATA**

The forked-fiddleneck has been designated a Category 2 species as a candidate for listing as either threatened or endangered by the U.S. Fish and Wildlife Service. The forked-fiddleneck has not been given special status by the California Dept. of Fish and Game.

The historic range of the forked-fiddleneck stretches along the inner coast ranges from eastern San Benito County south to southeastern San Luis Obispo County. There are approximately 40 known populations of Amsinckia furcata (Dean Taylor, personal communication 9/24/91), many of which have been discovered since 1982. Approximately 17 populations of the forked-fiddleneck occur on public lands within the Hollister Resource Area.

The habitat of the forked-fiddleneck is usually sparse, almost barren annual grassland on steep slopes and roadcuts where the soil is a white or dark brown shale talus or a very fine clay (Kiguchi, 1986). A few of its known populations grow on other soils such as patches of open sand at the base of large boulders and in clay or gravelly soils of roadsides. The forked-fiddleneck also has demonstrated the ability to colonize washes below areas of its more typical shale talus habitat. Common associates are the perennial barestem buckwheat (Eriogonum nudum var. indictum) and annual buckwheats. Threats to Amsinckia furcata include elimination of populations by surface-grading activities such as construction of oil and gas facilities, severe grazing, and in some cases, off-road vehicle use. Some forked-fiddleneck populations grow on roadcuts and other disturbed sites (such as naturally revegetated cattle trails, and small landslides) which indicates this species is tolerant of or may benefit from some level of disturbance. Because recent vegetation inventories have recorded 'new' populations it is believed that future inventories are likely to find additional populations. This species is probably not as rare or threatened by competing land uses as previously believed.

## **ONE-AWNED SPINEFLOWER - CHORIZANTHE RECTISPINA**

The one-awned spineflower is currently designated a Category 2 species as a candidate for listing as either threatened or endangered by the U.S. Fish and Wildlife Service. The one-awned spineflower has not been given any special status by the Calif. Dept. of Fish and Game.

Chorizanthe rectispina is known to occur in Monterey and San Luis Obispo Counties. There are less than 10 known populations, three of which are atop a ridgeline near Williams Hill in Monterey County, two of these on BLM-administered land.

Not much is known of this species' habitat except that it grows in openings of chaparral on granitic sand or disintegrating shale. C. rectispina is a prostrate growing annual which is easily overlooked in its pre-flowering growth stages. This, in addition to its late blooming season (June-July) and harsh environment (often dry, hot, and tough terrain) make it a difficult plant to locate. It is possible that its rarity is at least partly a function of these circumstances.



In the Hollister Resource Area C. rectispina is considered a potential species to be found near the San Ardo Oil Fields however only 40 acres in these fields are administered by BLM. One possible scenario under Alternative A is that isolated wildcat wells could be drilled on public lands in the hills near San Ardo which contain habitat for C. rectispina habitat. Due to this species prostrate growth habit, direct grazing impacts are probably negligible. Other potential impacts are not known at this time. The one-awned spineflower does occur on some heavily disturbed sites such as helipads and areas cleared of brush for fire prevention.

#### **CARMEL VALLEY BUSHMALLOW - MALACOTHAMNUS PALMERI VAR. INVOLUCRATUS**

The Carmel Valley bushmallow is currently designated a Category 2 species as a candidate for listing as either threatened or endangered by the U.S. Fish and Wildlife Service. This species has not been given any special status by the Calif. Dept. of Fish and Game.

The Carmel Valley bushmallow is known to occur in chaparral habitat from Carmel Valley in Monterey Co. south to Cuesta Pass in San Luis Obispo County. It can be common in areas recently burned after fire and very rare during long periods between fires. Several populations occur on BLM-administered lands in the Hollister Resource Area between the town of Jolon and Hwy. 101 in Monterey County. Like the one-awned spineflower discussed above, the largest oil and gas related threat to Carmel Valley bushmallow populations is isolated wildcat oil and gas exploration in the San Ardo area. Herbivores can also directly impact this species since it is eaten by cattle and deer and these animals are attracted to burned areas by the lush forage which grows after fires.

#### **SOUTH COAST RANGE MORNING-GLORY - CALYSTEGIA COLLINA VAR. VENUSTA**

The South Coast Range morning-glory is currently designated a Category 2 species as a candidate for listing as either threatened or endangered by the U.S. Fish and Wildlife Service. This species has not been given any special status by the Calif. Dept. of Fish and Game.

The South Coast Range morning-glory is known from a four-county area which includes Santa Barbara, Monterey, San Benito and Fresno Counties. Several populations were recently discovered in 1991 plant surveys. These populations were recorded in the Diablo Range near Vallecitos Valley, Laguna Mountain, and Turkey Flat.

Very little is known about this species historic distribution and the populations recorded in 1991 make up the majority of known locations. Threats to this species are likely to include severe livestock grazing, and the loss of habitat due to oil and gas development and rural development.

## PANOCH PEPPERGRASS - LEPIDIUM JAREDII SSP. ALBUM

Panoche peppergrass has not been given special status by either the U.S. Fish and Wildlife Service or the Calif. Dept. of Fish and Game. However BLM considers panoche peppergrass as a special status species because it is only known at five locations (four of which are on public lands within the Hollister Resource Area) and it has not recently been observed at several historical locations.

The historical distribution of Lepidium jaredii ssp. album is the eastern base of the San Benito Mountain-Joaquin Ridge portion of the Inner South Coast Ranges and the western edge of the San Joaquin Valley from Panoche Creek south to the Coalinga area in Fresno County (PGT-PG&E 1990).

Currently, Panoche peppergrass is known to occur in two areas in the Hollister Resource Area (the south side of Vallecitos Valley and in the Arroyo Hondo watershed, both in Fresno County) and one location in the Caliente Resource Area (near Orchard Peak in San Luis Obispo County). Oil and gas development is declining in the Vallecitos area where it is unknown if past oil and gas development has impacted Panoche peppergrass. Oil and gas activity has not yet occurred in the Arroyo Hondo watershed and this area has a moderate oil and gas potential.

The habitat for Panoche peppergrass is alluvial fans and washes that empty into the west side of the San Joaquin Valley and the watersheds (which are vegetated mostly by annual grasslands) above them. Upland populations are found on extremely hard-packed, fine clay soils which resemble cement. Little is known of Panoche peppergrass. Potential conflicting land uses could include sand and gravel mining, grazing, or severe surface-disturbing activities.

## WILDLIFE

The Hollister Resource Area contains approximately 300 species of wildlife including numerous birds, mammals, reptiles, and amphibians. Since management of each individual species is not practical, BLM management has focused on species of economic interest, threatened or endangered species, and preservation of natural habitats and habitat diversity.

Most oil and gas activities are expected to occur in or around the Coalinga/Avenal oil fields which are dominated by non-native grasslands and saltbrush steppe communities. Common wildlife species include side-blotched lizards, coyotes, hares, horned larks, lark sparrows, and Heermann's kangaroo rats. Most of these species are associated with open habitats with shrubs and/or burrows often used for cover. These areas also provide important habitat for several threatened or endangered species which are discussed under a separate heading in this chapter. They also provide habitat for California quail and desert cottontail rabbit populations which support some hunting opportunities.



Portions of Williams Hill are also given a high oil & gas potential and could be affected by oil & gas development. These public lands are located in the chaparral-covered hills between San Ardo and Lockwood. These hills are considered important wildlife habitat for the Santa Lucia deer herd. The habitat is in poor condition because of over-mature brushfields due to fire suppression or exclusion (USDI 1983). Due to large expanses of late successional chaparral, species diversity is considered low. The most important wildlife habitats are in riparian zones and in oak woodlands where animal abundance and diversity increases.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMALS**

There are five endangered animal species found in the Hollister Resource Area. In addition there is historic habitat for the endangered California condor. There are two additional endangered species found in the region which have no suitable habitats on public lands. Table #5 lists these eight endangered species. There are no threatened species found in the resource area.

The endangered San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat could be affected by oil & gas activities on public lands in the resource area. Habitat for these three species is depicted on Map #8.

The five other endangered species would not be affected by oil & gas activity on public lands. There is no habitat on public lands for the Fresno kangaroo rat or the Least Bell's Vireo. There are no known nesting sites for the American peregrine falcon. There would be no impact to winter habitat for the southern bald eagle near Squaw Leap and Hernandez Reservoir. Future reintroduction of California condor into the wild is not expected to result in recolonization of historic sites in the Hollister Resource Area.

In addition to these endangered species, there are also 20 other special status species that are listed as "candidate" species. These are species that are currently being considered for designation as threatened or endangered. One of these species, the San Joaquin Dune Beetle, is a Candidate 1 species which means that sufficient information exists to warrant placement of this species on the threatened or endangered list. The remainder are Candidate 2 species, which means they are rare and under threat but insufficient information is available to permit listing as threatened or endangered. These candidate species are listed on Table #6.

The only candidate species that could be affected by oil & gas activities on public lands are the San Joaquin antelope squirrel, the short-nosed kangaroo rat, the big-eared kangaroo rat, and five rare beetles (San Joaquin dune beetle, Ciervo aegialian scarab beetle, Hoppings blister beetle, maleston blister beetle, and Morrison's blister beetle). While several studies have been

conducted on these three small mammals, data are lacking on the five beetles. Additional site-specific analysis may be necessary to minimize impacts to these invertebrates.

The remaining candidate species do not occur on public lands or occur in restricted habitats that can be avoided by routine mitigation. Species that do not occur on public lands include the California tiger salamander, California red-legged frog, Southwestern pond turtle, spotted bat, and Monterey/Salinas ornate shrew. Species that occur in very specialized habitats and can be readily avoided by application of standard lease conditions include the San Joaquin dune beetle, tri-colored blackbird, California mastiff bat, and the San Joaquin pocket mouse.

Stipulations prohibiting surface occupancy within 1/2 mile of active raptor nests during the nesting and fledgling season is expected to preclude any impacts to golden eagles or other raptor species.

Following the tables are more detailed descriptions of those special status species that could be affected by oil & gas activities on public lands in the resource area.



**TABLE #5**  
**ENDANGERED ANIMAL SPECIES IN THE HOLLISTER RESOURCE AREA**

<u>SPECIES</u>	<u>KNOWN LOCATIONS</u>	<u>HABITAT</u>
San Joaquin Kit Fox <u>Vulpes macrotis mutica</u> (1,3)	Panoche Valley/ Kettleman Hills	saltbush grassland
Blunt-nosed leopard lizard <u>Gambelia silus</u> (1,2,3)	Panoche to Kettleman Hills	grassland/ washes
Giant Kangaroo Rat <u>Dipodomys ingens</u> (1,3)	West of I-5	grassland
Fresno Kangaroo Rat <u>Dipodomys nitratoide exilis</u> (1)	Kings County	grassland
California Condor <u>Gymnogyps californianus</u> (2,3)	Castle Mt.	Nest site
Bald Eagle <u>Haliaeetus leucocephalus</u> (2)	Hernandez Res. Squaw Leap	Lakes
American Peregrine Falcon <u>Falco peregrinus anatum</u> (2)		
Least Bell's Vireo <u>Vireo bellii pusillus</u> (1)	Bradley/San Ardo	riparian

(1) Reference from California Natural Diversity Data Base

(2) Reference from California Wildlife and Fish Habitat Relationships System.

(3) Reference from Hollister Resource Area known locations map records.

**TABLE #6**  
**"CANDIDATE" ANIMAL SPECIES IN THE HOLLISTER RESOURCE AREA**

<u>SPECIES</u>	<u>STATUS</u>	<u>KNOWN LOCATIONS</u>	<u>HABITAT</u>
San Joaquin Dune Beetle <u>Coelus gracilis</u> (1,3)	C-1	Monocline Ridge to Ciervo Mountain	sand dunes
Ciervo Aegialian Scarab Beetle <u>Aegialia concinna</u> (1)	C-2	Ciervo Hills	sand dunes
Hoppings Blister Beetle <u>Lytta hoppingi</u> (1)	C-2	Coalinga	grassland
Molestan Blister Beetle <u>Lytta molesta</u> (1)	C-2	Panoche Hills	saltbush/ grassland
Morrison's Blister Beetle <u>Lytta morrisoni</u> (1)	C-2	Griswold	grassland/ Ephedra
California Tiger Salamander (2) <u>Ambystoma tigrinum californiense</u>	C-2		ponds, grasslands
California Red-legged Frog <u>Rana aurora draytoni</u> (2)	C-2		streams/ ponds
Southwestern Pond Turtle <u>Clemmys marmorata pallida</u> (2)	C-2		streams ponds
Golden Eagle <u>Aguila chrysaetos</u> (2)	C-2	Panoche to Kettleman Hills	grasslands, scrublands, wetlands
Tri-colored Blackbird <u>Agelaius tricolor</u> (1)	C-2	Little Panoche Creek	Cattails, wetlands
Monterey Ornate Shrew <u>Sorex ornatus salarius</u> (2)	C-2	Salinas River delta	Riparian
Spotted Bat <u>Euderma maculatum</u> (2)	C-2	E. side San Joaquin valley	Ponderosa desert



California Mastiff Bat (2) <u>Eumops perotis californicus</u>	C-2	Salinas River drainage, Silver Cr. drainage	crevice/trees buildings
San Joaquin Antelope Squirrel <u>Ammospermophilus nelsoni</u> (1,3)	C-2	Panoche Hills to Coalinga	saltbush/ grassland
Big-eared Kangaroo Rat <u>Dipodomys elephantinus</u> (1,2)	C-2	Clear Creek Cantua Cr.	sagebrush scrub/chap
Short-nosed Kangaroo Rat (2) <u>Dipodomys nitratoides brevinasus</u>	C-2	Coalinga to Kettleman Hills	grassland
San Joaquin Pocket Mouse (1) <u>Perognathus inornatus</u>	C-2	E. side San Joaquin Valley	sand dunes, grasslands

(1) Reference from California Natural Diversity Data Base

(2) Reference from California Wildlife and Fish Habitat Relationships System.

(3) Reference from Hollister Resource Area known locations map records.

## **SAN JOAQUIN KIT FOX**

The kit fox is listed as endangered by the U.S. Fish & Wildlife Service. Detailed information on the biology of the kit fox is summarized in the species recovery plan (USFWS 1988). Originally it was a relatively common carnivore of the semi-arid habitats of the San Joaquin Valley from San Joaquin and Stanislaus counties south to Kern County (O'Farrell 1983). Starting in the early 1900s, agricultural, industrial, and urban developments brought about rapidly increasing rates of habitat loss that eventually led to population declines. Declines were through displacement, direct and indirect mortalities and reduction of prey base. By 1979, less than seven percent of its original habitat remained (Steinhart 1990).

Kit fox habitat occurs in open grasslands and saltbush grassland covered hills, on slopes of less than thirty percent, west of Interstate 5 in western Fresno and Merced counties. In the Hollister Resource Area there are more than 80 known active kit fox dens. These dens are found on public lands in the Tumey Hills, Ciervo Hills, and in the Coalinga/Avenal area. More than half of the known occupied dens on public lands in the resource area are found near or in the oil fields of the Coalinga area, with more than 25 of the dens in the Kettleman Hills. Most of the remaining habitat areas have a high or moderate oil & gas potential.

Kit fox are known to inhabit low to moderate intensity oil fields. While these animals continue to occupy such areas, individuals may be affected by direct loss of habitat or prey, contaminants, vehicle collisions, den entrapment, and degradation of habitat. Recent studies in Kern County indicate significant use of oil field pipe for den use.

Kit fox are primarily nocturnal but recent studies show that diurnal hunting occurs where diurnal prey is utilized. Adults and pups sometimes rest and play near the den entrance in the afternoons, but most activities commence near sunset and continue sporadically throughout the night. Kit fox occupy small individual dens. Kit fox dens may have one or numerous entrances. The kit fox's large home range covers an area of one to two square miles.

## **BLUNT-NOSED LEOPARD LIZARD**

The blunt-nosed leopard lizard is listed as endangered by the U.S. Fish and Wildlife Service. Detailed information on the biology of this species is contained in the revised recovery plan (USFWS 1985). This lizard once ranged through the San Joaquin Valley at least to Modesto and perhaps San Joaquin County (USFWS 1985). This species is now limited to scattered parcels of undeveloped land on the San Joaquin Valley floor from southern Merced County to western Kern County. The leopard lizards recent decline in its range and numbers is the result of a rapid increase in leveling and cultivating of arid lands in the San Joaquin Valley. It still occurs in most of its original habitat in the foothills on the western side of the valley. High-quality habitat declined from 228,000 acres in 1976, to 141,500 acres in 1979. By 1983, only about 104,500 acres remained. In 1990, less than seven percent of the San Joaquin Valley remained unaltered by agriculture or urban development (Steinhart 1990).



In the Hollister Resource Area blunt-nosed leopard lizards have been observed in the Panoche Hills, Tumey Hills, and in the Coalinga/Avenal area. Most of the sightings of this species in the resource area have been in the Coalinga/Avenal area. Many of the sightings have been within the developed oil fields. The remainder of the habitat areas generally have a high or moderate oil & gas potential.

Individual leopard lizards may emerge from hibernation as early as late March. By mid-April, most individual lizards are active. Timing of spring emergence is strongly temperature dependent. Activity is generally bimodal, and confined to morning and afternoon hours. The first eggs are deposited from early June to mid-July at the far end of a rodent burrow. The majority of hatchlings emerge in early August. Hatchlings may be active as late as mid-October. Both adults and hatchlings remain inactive underground in rodent burrows during winter.

Abandoned or occupied burrows of kangaroo rats and abandoned squirrel burrows are utilized for permanent shelter. Studies show that the lizards are absent or rare in hilly terrain, but favor adjacent lower slopes and wash systems. Distribution is often discontinuous and densities are low and extremely variable. Higher densities are one to three per acre on valley floor habitats. Available information on adjacent foothills and plains suggests a density under optimal conditions of less than 0.5 lizards/acre. Tollestrup (1982) estimated that one section of land is the minimum area necessary to perpetuate an isolated population in good habitat.

## **GIANT KANGAROO RAT**

The giant kangaroo rat is listed as endangered by the U.S. Fish & Wildlife Service. This species was once common across the western San Joaquin Valley from Merced County south, on the Carrizo Plain, and in the Cuyama Valley. Between 1972 and 1980 most of the areas inhabited by giant kangaroo rats were converted from native vegetation to cultivated agricultural crops. The loss of original habitat to agricultural conversion may be as much as 97-98 percent. Five relatively small areas totaling 12 square miles remain that support population densities typical of those existing prior to 1950.

Williams considers the giant kangaroo rat to be a good indicator of the health of remnant San Joaquin Valley endangered species habitats (Williams 1985). Kangaroo rats are an important component in the diet of the kit fox. Their burrow systems are used by blunt-nosed leopard lizards and San Joaquin antelope ground squirrels are found in giant kangaroo rat colonies.

In the Hollister Resource Area giant kangaroo rats are found in the Panoche, Tumey, and Ciervo hills. Most of the habitat is in areas of high or moderate oil & gas potential. Colonies found on public lands are not very large and are very susceptible to any disturbance. Monitoring has indicated that population numbers declined between 1980 and 1985 (USDI 1987).

Giant kangaroo rats live in colonies, each rat maintaining a burrow system about twenty feet in diameter surrounded by the burrows of neighbors. Burrow systems often consist of an average of seven entrances measuring 2.5-3.5 inches in diameter.

## **SAN JOAQUIN ANTELOPE SQUIRREL**

The San Joaquin antelope squirrel is listed as a Candidate 2 species by the U. S. Fish & Wildlife Service and is listed as threatened by the California Department of Fish & Game. Before irrigation came to the Central Valley, the San Joaquin antelope squirrel inhabited 3.4 million acres of arid, sparsely vegetated grasslands. Today less than one hundred thousand acres of the grassland that remains is in adequate condition to support the species (Steinhart 1990). Recent surveys indicate that 80 percent of the original geographic range of antelope squirrels has been converted to agricultural developments (Harris 1989). No prime habitat remains.

Low populations estimated by Harris (1989) at less than one squirrel per hectare occur in the Panoche and Tumey Hills. These areas have a moderate oil & gas potential.

These squirrels can tolerate much higher body temperatures than normal (up to seven degrees) than can most mammals. This allows them to remain active longer during the hottest part of the day (Steinhart 1990). Burrows used by this species are either dug by them or by other rodents including giant kangaroo rats. These burrows and the shade of large saltbrush shrubs are important for thermal regulation and escape cover. Habitat lacking these components are often unsuitable to support these animals.

## **BIG-EARED KANGAROO RAT**

The big-eared kangaroo rat is listed as a Category 2 species by the U.S. Fish & Wildlife Service. This species has not been studied since the 1930's. Williams (1986) finds no justification for recognizing *elephantinus* as a species separate from narrow-faced kangaroo rat. He has concluded that there is no justification to be concerned about the survival of this "species."

This species is found in sage/buckwheat chaparral vegetation areas in the vicinity of Clear Creek and Cantua canyons. These areas have moderate or no oil & gas potential.

## **VISUAL RESOURCES**

The landscape of the BLM lands in the Hollister Resource Area range from nearly level to rugged mountainous terrain located generally in rural ranching areas. Vegetation includes forested areas, chaparral, and open grassland. Cultural modifications of the public lands typically consist of range management projects such as fence lines, and livestock and wildlife



water developments. Electrical transmission lines, radio communication towers, water storage tanks, hiking trails, etc. are also located on some BLM lands.

There are approximately 315,000 acres of BLM public lands within the five county Hollister Resource Area. In most of the resource area the scattered public lands are a small portion of the overall landscape. Only a few portions of these public lands have outstanding scenic quality. The visual resources are particularly important on the public lands adjacent to the Pinnacles National Monument (National Park Service), lands adjacent to the Ventana Wilderness (U.S. Forest Service), and lands highly visible from I-5 and Highway 101. For additional discussion of visual aesthetic qualities per the Clear Air Act see the section on air quality in Chapter 3.

BLM lands in the resource area were inventoried for scenic quality in 1979. These inventories were used in 1984 when resource area lands were all assigned to one of four Visual Resource Management (VRM) classes (see Table #7) when the Hollister Resource Management Plan.

In addition to the BLM lands there are approximately 380,000 acres of privately owned lands where the U.S. has retained some or all of the mineral rights. The visual resources of these lands are similar to those of the BLM lands except there are scattered ranch buildings and a small portion of the lands have been converted to irrigated farm lands.

## **VISUAL RESOURCE MANAGEMENT CLASSES**

Each visual resource management (VRM) class consists of guidelines for the amount of acceptable change in the visual resources. A VRM class is based on the physical and sociological characteristics of any given area and serves as a management objective. The VRM classes are designated through the land use planning (RMP) process. Following is a description of the various VRM class objectives:

Class I - The objective of this class is to preserve the natural character of the landscape. This class provides for natural ecological changes however very limited management activity is allowed. Changes to the existing landscape should be of minimal visual impact and man's actions must not attract attention.

Class II - The objective of this class is to retain the natural character of the landscape. Changes are permitted but the visual impacts of the change should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the area.

Class III - The objective of this class is to partially retain the existing character of the landscape. There should be no more than a moderate level of change to the visual resources of the area. Management activities may attract attention but should not

dominate the view of the casual observer. Changes should repeat the basic elements found in the predominate natural features of the area.

Class IV - This class provides for management activities which require major modification of the landscape. The level of change to the landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impacts of these activities through careful location, minimal disturbance, and repeating the basic elements of the natural landscape.

## **DESCRIPTION OF AFFECTED AREAS**

Table #7 is a summary of VRM classifications, VRM sensitivity, and O&G potential for public lands in the Hollister Resource Area. Visual resources would not be affected in areas with no O&G potential. The application of standard mitigation measures would also be sufficient to preclude any loss of visual resource values in areas with moderate O&G potential, and moderate or low visual sensitivity. The following detailed descriptions cover those areas where oil & gas activities could impact visual scenic values. Scenic values generally depend on four factors: 1) the character of the natural landscape, 2) the extent of cultural modifications already present in the landscape, 2) the scenic quality of the landscape which is determined by evaluating the first two factors, and 4) visual sensitivity which considers how many people see the landscape, where they see it from, and how sensitive they are to modifications of the landscape.



**TABLE #7**  
**VISUAL RESOURCE MANAGEMENT CLASSIFICATION**

<u>Resource Management Area</u>	<u>VRM Classification</u>	<u>VRM Sensitivity</u>	<u>O&amp;G Potential</u>
San Benito Natural Area	I	Moderate	None
Pinnacles Watershed	II	High	Mod-None
Panoche Hills	III	High	Moderate
Cievro Hills/Joaquin Rocks	III	High	Moderate
Griswold/Tumey Hills	III	Moderate	High-Moderate
Condon Peak	III	Moderate	Mod-None
Pinnacles Mgmt Area	III	Low	Mod-None
Coalinga Mineral Springs	III	Low	Moderate
Squaw Leap	III	High	None
Sierra de Salinas	III	Low	None
Williams Hill	IV	Moderate	High-Moderate
Clear Creek	IV	Moderate	None
Coalinga	IV	Low	High
Central San Joaquin	IV	Low	High
Gabilans-Diablo	IV	Low	Moderate
Call Mt./Hernandez Valley	IV	Low	High-Moderate
Parkfield	IV	Low	Moderate

## EXISTING OIL FIELDS

Existing oil fields are located in the Coalinga/Avenal, Williams Hill (San Ardo), Griswold/Tumey Hills (Vallecitos) Management Areas. There is a federal interest in the oil produced from seven different oil fields.

Landscape Character - Most of the oil fields near Coalinga and Avenal in western Fresno County contain annual grasslands and low shrubs in the undisturbed areas. In the five fields with some federal mineral interest the topography ranges from nearly level to rugged deeply dissected hills.

The small Vallecitos Field is located in a remote ranching valley in eastern San Benito County. The mostly level ranching valley is surrounded by steep mountainous hillsides.

The San Ardo Field in southern Monterey County is located primarily on terraces of the Salinas River valley although a few wells are present on the adjacent rolling hillsides.

Cultural Modifications - The fields around Coalinga and Avenal are extensively developed with wells, pumping facilities, storage tanks, roads, etc. dominating the landscape. In the Vallecitos Field however wells and related facilities are scattered with only a few being readily visible from New Idria Road. Cattle grazing with fence lines, water troughs, and ranch buildings are the prevalent view throughout the Vallecitos Field. The San Ardo Field although covering a fairly small area is very intensely developed and has the appearance of an industrial area.

Scenic Quality - The oil fields around Coalinga and Avenal are of a low scenic quality with the oil fields, farming, residential, and commercial developments dominate the landscape. The Vallecitos Field area is of a low to moderate scenic quality. While the grazing facilities and some of the oil field developments in the foreground/middleground are the most prevalent features of the area, the chaparral and forested background provide variety and a somewhat greater scenic quality. The very intensely developed San Ardo field has a very low scenic quality with the intensively developed industrial facilities of the oil fields dominating the landscape.

Visual Sensitivity - Portions of the Coalinga and Avenal area oil fields are visible from I-5, Highway 198 and Highway 33. The San Ardo field is located immediately adjacent to and is highly visible from Highway 101. Due to existing wellhead structures, roads, and related facilities these oil fields are not considered to be visually sensitive. The lightly developed Vallecitos Field is located in a remote ranching valley in eastern San Benito County and has a low visual sensitivity.



## AREAS OF HIGH/MODERATE OIL & GAS POTENTIAL

### Interstate 5 Corridor

Portions of the Panoche Hills, Ciervo Hills/Joaquin Rocks, and Griswold/Tumey Hills Management Areas are visible from the I-5 Interstate Highway corridor. I-5 is the only north-south interstate freeway on the west coast of the continental United States and receives heavy truck and passenger vehicle traffic. The majority of vehicles are long distance through traffic going between the major population centers in northern and southern California. Within the Hollister Resource Area it runs generally along the boundary between the San Joaquin Valley to the east and the edge of the coastal mountain ranges to the west.

Landscape Character - Along most of the I-5 corridor the valley plane slopes gently to the east while the deeply dissected foothills of the coast range lie to the west. In Merced County the freeway runs mostly at the base of the foothills and the dissected drainages are easily seen. In Fresno County the foothill areas are generally several miles west of the freeway and appear more as rolling hills.

The valley plain for the most part is laid out in rectangular irrigated farm fields. The color and texture varies with the type of crop being grown and the time of year. Irrigation canals snake across the landscape in some areas. Most of the land east of I-5 is irrigated farmland. Pockets of irrigated farmland are also located west of the freeway.

The foothills of the coast range are rolling and deeply dissected. The vegetation is dominated by annual grasslands with scattered low shrubs in a few places. The fine uniform texture of the annual grassland vegetation blurs the edges of the hills and canyons and makes the hillsides appear to the casual observer as more gentle and rolling than is actually the case. The annual grasses are green in the winter and spring and a golden tan during the dry summer and fall months. The few powerlines, roads, and rock outcrops have little impact on this otherwise uniform appearing landscape.

In northwest Fresno County, Ortigalita Ridge is readily visible in the background views from I-5. North of Coalinga the Joaquin Ridge and peaks of the Diablo Range rise above the foothills and are also visible from I-5. The Joaquin Rocks are a prominent geologic feature visible on the horizon to southbound traffic.

Cultural Modifications - The agricultural fields, buildings, houses, and roads are prevalent in most of the I-5 viewshed. High voltage power lines, water tanks, irrigation canals, etc. are present in most areas. Commercial roadside services are located at several of the freeway interchanges. The main radio tower on Panoche Mountain can be seen from the freeway, especially to south bound traffic. To a lesser degree the radio towers on Black Mountain north of Coalinga, are also noticeable especially to northbound traffic.



Scenic Quality - The scenic quality of the irrigated farmlands is fairly low. The large expanses of farmland with little other development form a pleasant but somewhat uniform setting. The annual grassland hillsides are of a fairly regular pattern with few special features to provide variety, especially in Merced County. In a few locations the rugged peaks and the chaparral and forest vegetation of higher ridgelines can be seen as background views from I-5.

In Fresno County there is greater variety with the irrigated farmlands generally next to the freeway and rolling hills behind the fields to the west. These areas are of low to moderate scenic quality. North of Shields Avenue the mountainous Ortigalita Ridge is readily visible in the background. Also near Kamm and Derrick Avenues the chaparral and forested background of the Joaquin Ridge come into view. These sections are of moderate scenic quality. Near Coalinga the terrain is more open. From I-5 the oil fields, farm and ranch lands, and commercial developments dominate the viewshed from and the scenic quality is low.

Visual Sensitivity - Views from the I-5 corridor are made from passing vehicles on the freeway at about 65 miles per hour. The majority of the traffic is through traffic which may stop only to use roadside services, to change drivers, or for a rest stop.

A large block of public lands in the Panoche Hills lies one to three miles west of the freeway between the Shields Avenue and Panoche Road freeway interchanges. The sloping front sides of these hills are readily visible from the highway. However due to their generally rounded form, grass covered slopes, and lack of development they do not draw attention but instead form a backdrop to the irrigated farm fields in the foreground. The public lands in the Panoche Hills form an important part of the viewshed from I-5 in this area. A radio repeater tower on Panoche Mountain is readily noticeable from the freeway, especially to southbound traffic, but it is four miles away at its closest point. The Panoche Hills area is visually very sensitive to any development.

Public lands west of the freeway and south of the Panoche Road interchange in the Tumey and Ciervo Hills are also visible from the highway. However most of the area visible in the foreground and middle ground is privately owned. Topographic screening and distance hides much of the BLM lands in this area. However those lands that are seen are an important part of the scenery and are sensitive to any development.

Some parcels of land with federal mineral rights are located adjacent to or near the freeway on both sides of the highway. Due to their high visibility from the highway these parcels have a very high visual sensitivity to development activities.

Visual Resource Management Class - The scattered BLM lands in Merced County are classified as VRM Class IV as are the BLM lands in and around the developed oil fields near Coalinga. The Panoche Hills, Griswold/Tumey Hills, and Ciervo Hills/Joaquin Rocks are classified as VRM Class III.



## Williams Hill

Williams Hill is a block of public lands located about five miles west of Highway 101 between San Lucas and San Ardo in southern Monterey County. In addition privately owned lands with federal mineral rights lie two to five miles west of the highway.

Landscape Character - This area consists of rugged chaparral and grey (digger) pine covered slopes, annual grasslands, and dry farmed valleys. The lands visible from Highway 101 are of a fairly uniform dark green color except for the annual grasslands which are green in the winter and spring and a golden tan during the dry summer and fall months. Communication sites on the ridges are visible against the skyline to southbound traffic.

Cultural Modifications - The communication sites on the ridgeline are readily visible from Highway 101. Vineyards are present next to the highway near San Lucas and ranch lands in the rest of the area.

Scenic Quality - The variation in topography, colors, and mostly natural character of the landscape gives this area moderate to good scenic quality.

Visual Sensitivity - These lands are highly visible from Highway 101 and provide a scenic background to the west side of the highway. Traffic on highway 101 in Monterey County south of Salinas is light to moderate. There is a mixture of local traffic and through traffic between cities up and down the central California coast. Some long distance recreational traffic uses highway 101 as a scenic alternative to Interstate-5.

Visual Resource Management Class - The public lands in the Williams Hill area are designated as VRM Class IV.

## Pinnacles Area

BLM lands and private lands with BLM administered minerals are found adjacent to and near the Pinnacles National Monument. The areas to the northeast of the National Monument have a moderate potential for the occurrence of oil and gas deposits. Other areas to the north, west, south and southeast of the National Monument are believed to have no potential for oil and gas potential.

Landscape Character - This area consists of rugged chaparral covered slopes in the Gabilan Mountain Range. Chamise chaparral is found mainly on south facing slopes and contains some digger pines in scattered favorable locations. Mixed chaparral occurs with manzanita, digger pines, buckbrush, and scrub oak being some of the primary species. The chamise chaparral areas have a fairly low degree of texture with a mostly uniform

color. The mixed chaparral areas have a more rugged texture and greater color contrasts.

Cultural Modifications - There is a CDF lookout tower on North Chalone Peak within Pinnacles National Monument that is visible from various locations throughout the area. High power electrical transmission lines are present in the north and west. Ranch buildings and facilities are located on the private lands.

Scenic Quality - Scenery outside of the National Monument is common to the region. The variation in topography, colors, texture and mostly natural character of the landscape gives this area a moderate scenic quality.

Visual Sensitivity - Much of the BLM area is either visible from hiking trails within the National Monument or from the state highways going to the Monument. Highways 25 and 146 lead to the east side of the Monument and highway 146 out of Soledad goes to the west side. Both the BLM lands and the private lands with BLM managed minerals in the area near Pinnacles National Monument have a high visual sensitivity.

Visual Resource Management Class - The public lands in the watershed area of the Pinnacles National Monument has been designated as VRM Class II with the remainder of the area designated VRM Class III.

## **WATER QUALITY**

### **SURFACE WATER**

Water quality and availability varies greatly within the Hollister Resource Area. Most of the area which could be impacted by the federal oil & gas lease program have few perennial streams and springs of good quality water.

Much of the resource area is characterized by steep terrain with highly erosive soils. Most of the seasonal runoff occurs during storms during the winter and early spring, often with most of the total yearly discharge coming down these stream channels in a single two or three day storm period. These waters carry a high percentage of sediment during runoff periods. California code, however, does not permit the construction of oil or wastewater sumps in natural drainage channels (SWRCB 1975).

During 1982 the BLM conducted an inventory of water resources in the resource area (USDI 1983). A review of the stream inventory and oil & gas occurrence potential maps (Milliken 1990a) indicates that Silver Creek is probably the only perennial stream that could be impacted by oil & gas production on federal leases. Silver Creek flows through the Vallecitos oil field where there are 8,000 federal acres under lease and 13 producing wells on federal leases.



In 1989 an oil spill from a storage tank on a federal lease in the Vallecitos field resulted in contamination of the Silver Creek drainage. In 1988 a large oil spill occurred when a pipeline erupted on a federal lease in the Coalinga area resulting in spillage of 20,000 to 30,000 barrels of oil (Milliken 1990c).

## **GROUNDWATER**

Most oil & gas exploration and development activity on federal leases is expected to occur in the Coalinga vicinity. The quality of groundwater in this area is poor. The water contains high concentrations of sodium and sulfates. The groundwater has also been contaminated by past oil field waste disposal practices (FCPC 1980). Because the groundwater is contaminated, drinking water is imported under contract from the U.S. Water and Power Resource Service.

Activity on federal leases could also affect groundwater near the San Ardo and Vallecitos oil fields. Groundwater near the San Ardo oil fields is high in sulfur, but water quality of the downstream Salinas Valley aquifer is good (Monterey County 1987). The Regional Water Quality Control Plan does not identify any groundwater basins in the Vallecitos area (CWRCB 1990).

## **SOILS**

There are 17 soil associations that occur on the public lands in the Hollister Resource Area with hundreds of soil types. Erosion potential of soils in this region is generally related primarily to slope. Areas below 30% slope generally have low to moderate erosion potential while areas above 30% slope have high erosion potential (Monterey County 1987). High concentrations of selenium have been recorded in soils derived from Moreno formation sediments.

Most soil disturbing activities on federal oil & gas leases is expected to occur in and around the Coalinga/Avenal oil fields. Soils in this area are generally Cantua or Kettleman-Cima associations. These soils are generally sandy, loamy soils overlying highly weathered calcareous sandstones with a moderate to sparse vegetative cover. Runoff is slow with most areas having a moderate erosion potential. Kettleman soils on south and west slopes have a high erosion potential (Anderson 1967).

## **OIL AND GAS RESOURCES**

There are currently 14,780 acres of federal lands leased for oil & gas exploration and development within developed oil fields in the Hollister Resource Area. These lands are in the Vallecitos (8,000 acres), Coalinga (3,000 acres), Kettleman North Dome (2,560 acres), Jacalitos (700 acres), East

Coalinga Extension (480 acres), and San Ardo (40 acres) fields. There are 128 producing oil & gas wells on BLM administered federal leases in the Hollister Resource Area. Most of the producing wells are in the Coalinga vicinity with 46 wells in the Coalinga oil field, 31 in the Kettleman North Dome field, 17 in the E. Coalinga field, nine in the Jacalitos field, four in the Pleasant Valley field, and three in the Gujarral Hills. The only other producing wells on federal leases are 13 wells in the Vallecitos field and five wells in the San Ardo field. Oil production figures for these fields is summarized in Table #8.

The U.S. Geological Service predicts there are over two billion barrels of undiscovered recoverable reserves in the 35 oil and gas fields in the Hollister Resource Area. The largest field, Coalinga accounts for almost half of the reserves. The top four fields, Coalinga, East Coalinga Extension, Kettleman North Dome, and San Ardo account for 88% of the resource area's remaining reserves (Milliken 1990a).

In 1988 there were a total of 5,996 producing wells in the resource area. One-hundred and twenty-eight of these wells or about 2% of the producing wells are located on federal leases administered by the BLM. Since 1979 oil production has been steadily increasing in the Coalinga field, holding steady in the East Coalinga field, and declining in San Ardo (Milliken 1990c).

About 40% of the public land in the resource area is currently under lease for oil & gas exploration and development. Areas currently under lease are depicted on Map #2. During the past five years there has been an average of about one wildcat exploration well drilled each year.

BLM petroleum geologists have recently completed studies of oil & gas potential within the resource area (Milliken 1990a). The resource area has been divided into areas of high, moderate and no oil & gas potential. These areas are depicted on Map #2. Most of the high potential areas are in or adjacent to the producing oil fields. The areas with "no O&G potential" are underlain with Franciscan and intrusive basement rocks.

Based on these studies and evaluation of historic trends BLM petroleum geologists have projected that "the probability of a new field discovery on public lands in the Hollister Resource Area over the plan life (15 years) is less than 5%" (Milliken 1990d).



**TABLE #8**  
**OIL PRODUCTION IN THE HOLLISTER RESOURCE AREA (1989)**

OIL FIELD	FEDERAL ACREAGE	% FEDERAL ACREAGE	FEDERAL PRODUCTION (BARRELS/OIL	TOTAL CUM. FIELD PRODUCTION M/BBLS OIL	% FEDERAL PRODUCTION	TOTAL PRD WELLS/TOTAL NP WELLS/# FEDERAL WELLS	WATER CUT IN %
COALINGA	320	?	76,467	764,665	.01	2319/ 1187/ 46	88.8
COALINGA UNIT	2,796	0.679	3,740,173 (1)				
EAST COALINGA EXT.	480	0.9	49,971	499,714	.01	81/ 111/ 17	91.9
KETTLEMAN DOME	2,560	76.5	14,938,112	45,825	32.7	49/ 238/ 31	86.7
VALLECITOS	8,000	75	342,973	5,119	6.7	22/ 18/ 13	91.5
JACALITOS	700	14.8	3,764,475	22,275	16.9	23/ 103/ 9	47.9
SAN ARDO	40	0.1	41,206	412,056	0.1	577/ 741/ 5	95.1
PLEASANT VALLEY				13,310		4	78.6
GUIJARRAL HILLS				48,875		3	77.8
<b>TOTAL</b>	<b>14,916</b>		<b>19,213,204</b>	<b>1,749,654</b>		<b>128</b>	

(1) Unit Production

## **WILDERNESS**

The Bureau of Land Management has recently completed extensive studies evaluating the wilderness potential of public lands in California. Within the Hollister Resource Area three Wilderness Study Areas (WSAs) were evaluated in the Central California Wilderness Study (USDI 1989). These areas are the Panoche Hills South WSA (6,677 acres), the Panoche Hills North WSA (11,267 acres), and the Pinnacles Wilderness Contiguous (5,838 acres).

None of these areas are currently under lease for oil & gas exploration and development. These areas would not be made available for leasing until Congress completes evaluations of their wilderness suitability and concurs with the BLM recommendation that they are not suitable for wilderness.

After extensive studies, the Bureau of Land Management has concluded that most of these areas are not suitable for wilderness. The only area being recommended to Congress for wilderness designation are 2,200 acres adjacent to the northern boundary of the Pinnacles National Monument (USDI 1989). This area is within the viewshed and watershed of the monument. It has been determined that this area has no oil & gas potential (Milliken 1990a).

The environmental impacts of oil & gas leasing on wilderness values was extensively analyzed in the Central California Study Areas Environmental Impact Statement (USDI 1989). Because this previous EIS addressed these impacts, no additional analysis is provided in this EIS.



# **CHAPTER FOUR**

## **ENVIRONMENTAL CONSEQUENCES**

### **ALTERNATIVE "A" - CURRENT MANAGEMENT**

#### **REASONABLY FORESEEABLE DEVELOPMENT SCENARIO**

This alternative is a continuation of current management practices. BLM geologists have developed "Reasonably Foreseeable Development" scenarios to provide a basis for impact assessment. The scenarios are based on the potential for oil and gas occurrence and the production history within the resource area. The scenarios provide anticipated levels of oil & gas exploration and development for the next 15 year period. These are not actions being proposed by the BLM, but are indirect actions that are expected to occur as a consequence of leasing. Affected acreage is summarized in Table #9. The detailed scenarios are available for review at the Bakersfield District BLM Office (see Milliken 1990c & 1990d). A more detailed description of surface disturbance resulting from oil & gas operations on public lands is contained in Appendix B. Anticipated levels of development under the Current Management Alternative (Alternative "A") are:

#### **Within Existing Developed Oil Fields (see Map #2)**

- A) There would be long-term disturbance & occupancy of 450 acres and temporary disturbance of an additional 150 acres. This disturbance would include about 200 new wells and associated roads. Each new well is expected to result in average surface disturbance of about two acres. About 75 of these wells are not expected to be successful and the 150 disturbed acres would be reclaimed as soon as the exploratory drilling operation was completed. The remaining 125 wells are expected to be successful and would be put into production. This is expected to result in about one additional acre of disturbance per well for associated pipelines/roads. About 25 small tank farms are also expected to be developed to service these new wells. Each tank farm is expected to disturb about one acre and would consist of separators and three tanks. There could also be about 20 injection wells drilled to inject steam into the oil reservoir to enhance recovery of the oil. The injection wells would disturb about 50 acres. Additional auxiliary facilities are not expected to be constructed on federal lands nor would federal leasing require additional facilities beyond those built to service operations on private lands.

- 1) About 370 acres of this disturbance would be in the Coalinga/Avenal area oil field.
  - 2) Most of the remaining 230 acres of disturbance would be in the E. Coalinga or San Ardo oil fields.
- B) During this same period about 100 production wells would be abandoned along with 20 associated tank farms. This would result in the reclamation of about 320 acres that are currently occupied by oil production facilities.
- C) The net long-term disturbance over the next 15 years, resulting from new development offset by reclamation associated with the abandonment of existing wells, would be about 130 acres.
- D) There could also be very transitory disturbance of an additional 140 acres resulting from seismic explorations. Temporary disturbances resulting from seismic exploration usually range from several trucks travelling along or adjacent to an existing road, to the drilling of numerous small "shot-holes" along a transect with each shot-hole disturbing about a 10-foot radius.
- E) To provide a basis for the analysis of the cumulative impacts of oil & gas development and exploration, it is also necessary to review actions anticipated on private lands within the oil fields. Anticipated oil field development activities could affect a total of up to 12,400 acres within the developed oil fields. This sum is an aggregate of disturbance resulting from activity on both federal and private lands. Many of the affected acres on private lands have already been severely disturbed by historic oil field operations. This disturbance would result from the drilling of up to 4,000 new wells with about 2,500 resulting in production wells, and up to 450 injection wells. During this same period about 1,000 existing wells would be abandoned with reclamation of up to 2,200 acres.

#### **Within Areas With High or Moderate Oil & Gas Potential (see Map #2)**

- A) The most probable scenario for federal leases is that there would be four to six unsuccessful wildcat wells. Each well would result in the temporary disturbance of up to two acres for a total disturbance of 16 acres. These areas would be reclaimed following completion of the drilling activities.
- B) There is a less than 5% chance that there could be a new oil or gas field discovery on federal lands with "high" oil and gas potential. The probability of a new field discovery on "moderate" potential lands is therefore considered



remote. If a new field is discovered, it is expected to be relatively small with no more than 16 producing wells. Total surface disturbance from well pads, associated roads and pipelines, and tank farms would be about 55 acres.

- C) There could also be a very transitory disturbance of an additional 180 acres resulting from seismic explorations. Temporary disturbances resulting from seismic exploration usually range from several trucks travelling along or adjacent to an existing road, to the drilling of numerous small "shot-holes" along a transect with each shot-hole disturbing about a 10-foot radius.
- D) On both federal leases and private lands within the resource area, a total of up to 200 wildcat wells could be drilled resulting in the temporary disturbance of up to 400 acres. Up to ten new oil or gas fields could be discovered but it is anticipated these new fields would most likely be in the San Joaquin Valley within areas where the surface is already disturbed by agricultural and other development activities. These new fields could result in up to 160 new development wells with a total surface disturbance of up to 630 acres.
- E) To address cumulative impacts it is also necessary to consider other actions that could affect environmental conditions. Anticipated actions on public lands include continued livestock grazing and increased recreation use. Private lands are expected to be affected by continued population growth, and subsequent urbanization and conversion of natural lands to urban and industrial uses.

#### **Within Areas With "No" Oil and Gas Potential (see Map #2)**

- A) The most probable scenario for these areas is that there would be no oil and gas exploration or development activity, however other actions described in section E above are expected to also occur in these areas.
- B) There is a less than 5% chance that there could be one or two exploratory wells resulting in the temporary disturbance of up to five acres.

**TABLE #9**  
**ALTERNATIVES "A, C, D, & E"**  
**SUMMATION OF AFFECTED ACRES**

<u>O&amp;G POTENTIAL</u>	<u>EXPLORATION</u> <u>TEMPORARY IMPACTS</u>			<u>DEVELOPMENT</u> <u>LONG-TERM IMPACTS</u>			<u>ABANDONMENTS</u> <u>RECLAIMED ACRES</u>			<u>NET LONG-TERM</u> <u>DISTURBANCE</u>		
	<u>BLM</u>	<u>PVT</u>	<u>TOTAL</u>	<u>BLM</u>	<u>PVT</u>	<u>TOTAL</u>	<u>BLM</u>	<u>PVT</u>	<u>TOTAL</u>	<u>BLM</u>	<u>PVT</u>	<u>TOTAL</u>
Existing Oil Fields	290	3,000	3,290	450	11,950	12,400	320	2,200	2,520	130	9,750	9,880
High/Moderate O&G Potential												
Most Likely Scenario	195	385	580	0	630	630	0	0	0	0	630	630
Less Than 5% Probability (Additional Impacted Acres)				55						55		
No Potential												
Most Likely Scenario	0	0	0	0	0	0	0	0	0	0	0	0
Less Than 5% Probability	5											
<b>TOTAL AFFECTED ACRES</b>	<b>490</b>	<b>3,385</b>	<b>3,870</b>	<b>505</b>	<b>12,580</b>	<b>13,030</b>	<b>320</b>	<b>2,200</b>	<b>2,520</b>	<b>185</b>	<b>10,380</b>	<b>10,510</b>



## AIR QUALITY

This analysis focuses on ozone generating compounds and PM-10 since these are the pollutants that are currently impacting human health and public welfare in the region, and that are emitted by oil & gas exploration or development activities. Increases in emission of ozone generating compounds, reactive organic gases (ROGs) and nitrogen oxides, can result from exploratory drilling operations, and from the development of new oil wells and supporting facilities. Increases in fine particulate matter (PM-10) emissions can result from dust generated by seismic exploration activities, travel on paved and unpaved surfaces in conjunction with oil exploration or development activities, and indirectly from the emission of gases, such as reactive organic gases and nitrogen oxides, which are then turned into small particles in the atmosphere. For purposes of analysis it has been assumed that the drilling of new wells would be distributed evenly throughout the 15 year life of the plan.

### SAN JOAQUIN VALLEY AIR BASIN

Lease operations on federal lands during the next 15 years are expected to result in the drilling of approximately 205 exploration & development wells, the development of 125 of these wells for oil or gas production, 25 new tank farms, and 20 injection wells. During this same period 100 existing wells, 20 tank farms, and the 80 unsuccessful wells would be abandoned. The net increase would be 25 new producing wells, five new tank farms, and 20 injection wells. Most of this activity is expected to occur within developed oil fields in the San Joaquin Valley Air Basin (Milliken 1990c).

Seismic exploration activities are not expected to result in measurable increases in PM-10 emissions if stipulations requiring dust emission controls are enforced.

The projected drilling of 225 new wells would result in temporary increases in emissions of ROGs and nitrogen oxides. Emission studies contracted by the California Air Resources Board indicate the average new oil well drilled with diesel engines in the San Joaquin Valley results in emissions of about 610 lbs of nitrogen oxides, 24 lbs of ROGs, and 48 lbs of particulate matter (PM-10) (Dennison et al 1983). The 225 exploration, development, or injection wells would result in emissions of 137,250 lbs of nitrogen oxide, 5,400 lbs of ROGs, and 10,800 lbs of particulate matter. If this activity was evenly distributed over the next 15 years, average annual increase in emissions would be about 9,150 lbs of nitrogen oxides, 360 lbs of ROGs, and 720 lbs of particulate matter. These figures could be reduced significantly if the traditional diesel engines were replaced with gas or electric engines. In 1979 85% of the drilling rigs in the San Joaquin Valley were diesel powered (Dennison et al 1983).

The net increase of 25 producing oil wells and supporting tank farms would result in long-term increased emissions of ROGs and nitrogen oxides. There is also a less than 5% chance that there could be the discovery of a new oil or gas field on federal lands with as many as



16 new wells. Emissions in producing oil fields come from a wide variety of sources including tanks, well cellars, sumps and pits, valves, fittings, well heads, pumps, compressors, internal combustion engines, heater treaters, streamers and boilers, mechanical oil/water separators, fireflooding, and flares (Dennison et al 1983).

In 1979 KVB, Inc. prepared an analysis of emissions from crude oil production facilities in California for the California Air Resources Board. The analysis compiled emission data for each of the major oil fields in California. Based on this information an average well in Fresno County was estimated to annually emit about 2,365 lbs of reactive organic compounds, 1,120 lbs of nitrogen oxides, and 385 lbs of particulate matter (Dennison et al 1983). Based on this data the 40 new wells on federal leases would emit 94,600 lbs of reactive organic compounds, 44,800 lbs of nitrogen oxides, and 15,400 lbs of particulate matter. This assumes however that there has been no improvement in pollution emission technology in the oil fields since the base year of 1979. Since 1979 ROG emissions in the San Joaquin Valley have dropped about 30%. The imposition of more stringent controls on oil & gas production emissions is considered one of the major factors responsible for this reduction in ROG emissions. There has been no comparable drop however in emissions of nitrogen oxides or particulate matter (CARB 1988). Adjusting the above figures to account for the more stringent controls currently in place could reduce the expected emissions of reactive organic compounds to 66,220 lbs per year.

These figures for emissions from crude oil facilities do not include emissions from stream enhanced oil recovery well vents. While these vents can result in significant emissions of reactive organic compounds it is anticipated that requirements for centralized vapor recovery systems would fully control these emissions (Dennison et al 1983).

Based on this analysis the total net annual new emissions expected to result from federal O&G leases by 2005 would be 53,950 lbs of nitrogen oxides, 66,580 lbs of reactive organic compounds, and 16,120 lbs of particulates. It is anticipated that all of these emissions would occur in Fresno County. These emissions would represent a .1% increase in nitrogen oxide, a .1% increase in ROGs, and a less than .01% increase in particulates above Fresno County 1987 emissions (FAQCB 1987).

## **Cumulative Impacts**

Cumulative impacts have been addressed by reviewing comparable oil & gas exploration/development activities that are expected to be occurring simultaneously on adjacent private lands. During the next 15 years it is anticipated that up to 4,450 new wells would be drilled on private lands with about 2,500 resulting in producing wells. During this period about 1,000 existing wells would be abandoned (Milliken 1990c). Using procedures outlined above, new well drilling on private lands would result in annual increased emissions of 180,965 lbs of nitrogen oxides, 7,120 lbs of ROGs, and 14,240 lbs of particulates. Development of new wells and supporting facilities would add annual emissions of 2,483,250



lbs of ROG, 1,680,000 lbs of nitrogen oxides, and 577,500 lbs of particulates. Total annual new emissions from oil & gas activities on private lands by year 2005 would be 1,860,965 lbs of nitrogen oxides, 2,490,870 lbs of ROG, and 343,480 lbs of particulates.

Emissions from oil & gas exploration/development activities on both federal and private lands by year 2005 are expected to result in a 2.9% increase in nitrogen oxide, a 3.8% increase in ROG, and a 1.4% increase in particulates above Fresno County 1987 emissions. Current projections for emissions from all sources in the San Joaquin Valley forecast a 4% increase in nitrogen oxides, a 7% increase in ROG, and 29% increase in particulate matter by the year 2000 (CARB 1988).

While a simultaneous reduction in both NOX and ROG produces significant reductions in ozone, reductions in only one pollutant can result in an increase or no change in ozone concentration. Despite a 30% drop in ROG emissions in the central part of the San Joaquin Basin (Fresno, Madera, Kings, & Tulare counties) indications are that ozone concentrations have increased (CARB 1988). No modelling of emission data was attempted in conjunction with this evaluation since the specific physical location of the projected emissions is hypothetical and Fresno County Air Quality Control Board staff have indicated that effective models for the San Joaquin Valley have not been developed.

A review of this cumulative impact data would indicate that while projected emissions from federal O&G lease activities are inconsequential when viewed in isolation, that when viewed in conjunction with other activities they are part of a very substantial environmental degradation and health problem. The projected inability of Fresno County to meet federal standards for air pollutant emissions can be expected to result in lung damage to individuals with asthma or emphysema, and nausea, headaches, irritated eyes, and dizziness among otherwise healthy individuals, particularly the young and elderly, and in continued crop damage (current estimates place crop losses at 10 to 20%) (CARB 1989).

## Mitigation

Proposed actions on federal lands are limited to the drilling of new wells, development of new wells, and construction of limited support facilities such as sumps, oil/water separators, and storage tanks.

The most significant mitigation measure that could reduce emissions would be the substitution of electric or gas engines for diesel engines that currently dominate the San Joaquin Valley oil fields. It is anticipated that the use of electric engines would virtually eliminate nitrogen oxide and indirect particulate emissions associated with oil production since most of these emissions are the product of internal combustion engines (see figures in MBUAPCD 1989). They would also eliminate most ROG emissions associated with drilling of new wells. The major hinderance preventing the conversion of wells to electric power is the lack of readily assessable power lines to tie into local utility grids (see Chee 1990). Most activity projected to occur on federal lands, however, would be within existing oil fields where electric utility



lines are usually present. Even in those situations where the construction of new power lines would be necessary, the long term reduction in pollution over the life of the oil field could warrant the construction of new lines. The construction of new lines to federal leases within the oil fields could also result in significant reductions in emissions on adjacent private lands since the utility lines would also be available for the conversion of diesel facilities on the private lands.

Covering oil production sumps with flexible membrane, rigid pontoon or fixed covers or replacing sumps with tanks could reduce ROG emissions associated with the sumps by about 90%. Unfortunately the sumps only account for about 5% of the ROG emissions (MBUAPCD 1989).

Installation of vapor recovery systems on storage tanks could also reduce ROG emissions. The Monterey Bay Unified Air Pollution Control District has evaluated sealed covers on air/water separators and has determined they are not an efficient pollution reduction method (MBUAPCD 1989).

## **NORTH CENTRAL COAST AIR BASIN**

Activities anticipated on federal oil & gas leases within the North Central Coast Basin contrast sharply with those projected for the San Joaquin Valley Air Basin. During the next 15 years it is anticipated there would be no more than 10 exploration & development wells with as many as three wells resulting in new production. The remaining seven wells would be abandoned along with five or more existing wells. There are two oil fields within the basin that contain federal leases. The San Ardo field has 40 acres of federal lands while the Vallecitos field has 8,000 acres under federal lease. There are however only five producing wells on federal leases in the San Ardo field and only 13 producing wells on federal leases in the Vallecitos field. In the San Ardo field well abandonments are expected to exceed new developments under the most optimistic scenario (Milliken 1990c). In the Vallecitos field no new development is anticipated with several existing wells being abandoned. There is a less than 5% possibility that an exploration well could result in discovery of a small new oil field consisting of as many as 16 new wells (Milliken 1990d).

The net product, under the most optimistic development scenario, would be 10 new exploration or development wells and a net gain of seven producing wells on public lands. Since no data is available on specific emissions related to exploratory wells within the North Central Coast Air Basin, average emission figures for diesel drilling operations in California have been used. These figures indicate the average oil or gas well drilling operation in 1979 resulted in emissions of 720 lbs of nitrogen oxides, 30 lbs of ROG's, and 55 lbs of particulates (Dennison, et al 1983). The ten new wells would result in average annual emissions over the 15 year life of the plan of 480 lbs of nitrogen oxides, 20 pounds of ROG's, and 35 lbs of particulates.



The net gain of seven producing oil wells and supporting tank farms would result in increased emissions of ROGs and nitrogen oxides. The 1979 KVB, Inc. analysis indicated the average oil well in the San Ardo field produced 1,991 lbs of ROGs, 4,360 lbs of nitrogen oxides, and 2,077 lbs of particulates (Dennison, et al 1983). The net gain of seven producing wells could be expected to increase emissions by 13,937 lbs of ROGs, 30,520 lbs of nitrogen oxides, and 14,594 lbs of particulates.

By 2005 the net annual increased emissions from federal leases would be 21,795 lbs of nitrogen oxides, 8,945 lbs of ROGs, and 10,185 lbs of particulates.

An additional specific concern with air pollution in this basin are potential impacts to areas the California Air Resources Board has designated as Class I air quality management areas. The two Class I areas are the Ventana Wilderness and Pinnacles National Monument. Emissions from exploratory wells on adjacent or nearby BLM lands could cause temporary impacts to air quality in these areas by increasing the emissions of ozone generating compounds and particulates. The discovery of a new oil or gas field could result in long-term degradation of air quality through the life of the oil field. The generation of particulates is of particular concern since particulate concentrations are a major factor affecting visibility.

A comparison of predominant wind patterns and BLM lands where O&G exploration could occur indicates very little chance activities on BLM lands would affect air quality in the Ventana Wilderness (USDA 1983). BLM lands with moderate oil & gas potential, however are immediately adjacent to the eastern boundary of the Pinnacles National Monument. Any O&G exploration or development in this area could have a negative impact on air quality in the monument. Air monitoring in the monument already indicates that ozone levels exceed federal standards. The Monterey Bay Unified Air Pollution Control District is currently conducting atmospheric modeling studies to determine the source of ozone precursor pollutants that are affecting the monument (MBUAPCD 1989).

No air modelling of emission data has been attempted in conjunction with this evaluation since the specific physical location of the projected emissions is hypothetical, and the regional air pollution control board is currently conducting a study to model the generation and movement of ozone which is the primary pollutant of concern.

## **Cumulative Impacts**

The trends described above for the Vallecitos and San Ardo fields are expected to apply equally to private lands. Overall, abandonments of existing wells are expected to exceed new development wells by 150 to 750 wells by year 2005 (Milliken 1990c). These projections are based on declining oil reserves in the existing fields. They represent a 10% to more than 50% reduction in the number of producing wells in these oil fields. During this same period (1990-2005) the regional Air Quality Management Plan anticipates reductions in emissions

associated with oil & gas production of 33% for ROGs, 54% for nitrogen oxides, and 59% for particulates (MBUAPCD 1989).

The regional Air Quality Management Plan projects that the North Central Coast Basin will be able to maintain federal standards for all pollutants by 2005 (MBUAPCD 1989).

## **Mitigation**

All mitigation measures described for the San Joaquin Valley Air Basin would also be appropriate for this basin. Both the Vallecitos and San Ardo oil fields are currently serviced by electric power lines. Declining production in these fields and their limited life span, however could foster economic conditions making conversion of facilities to electric power uneconomical.

Air modelling studies could be required before any emissions were allowed on leases potentially impacting the Pinnacles National Monument. If the studies indicated that the air quality of the monument would be impacted, then use of electric power could be required to minimize air quality impacts on the monument.

## **VEGETATION**

### **PROJECTED IMPACTS WITHIN EXISTING OIL FIELDS**

Six hundred acres of public lands available to oil and gas leasing are projected to be severely disturbed by such activities as oil well site and tank construction. Though 150 of these acres are expected to be quickly reclaimed, the initial severe surface disturbance is likely to remove most, if not all, perennial (long-lived) plants and would have a significant adverse impact on most populations of native annuals (short-lived species) on the entire 600 acres. Severe surface disturbance usually results in the invasion of introduced weedy species such as tumbleweed (*Salsola iberica*) and sandbur ragweed (*Ambrosia acanthocarpa*). Introduced species such as these can prevent native species from getting reestablished on disturbed sites and can also aggressively spread to adjacent undisturbed areas displacing additional native plant populations. Disturbed areas can also fragment native plant populations into smaller population areas which would be less able to recover from unpredictable natural events such as floods, fire, or disease. Once populations are fragmented they are also less resilient to impacts from heavy grazing or off-road vehicle use.

Approximately 500 of the 600 acres discussed above are expected to be within the Coalinga, East Coalinga, and San Ardo Oil Fields. The most common vegetation in these oil fields is annual grassland. Plant communities of special concern such as oak woodland, wetlands, sand dune communities, and perennial grasslands are not expected to occur within these



fields. Pockets of saltbush scrub and ephemeral drainages, which are better able to support saltbush than adjacent uplands due to higher soil moisture, have been heavily impacted by oil and gas development in these fields in the past. Vegetation resources of concern such as saltbush scrub, which remain in these oil fields, merit special protective measures (see mitigation below).

Also within existing oil fields an additional 140 acres is projected to be impacted by relatively light surface disturbance resulting from seismic exploration. Seismic exploration can directly impact native vegetation by crushing plants. Seismic exploration can also indirectly impact native vegetation by disturbing the surface enough to encourage the growth of weedy species which compete with the native plant species and by compacting the soil which reduces soil oxygen and water available to plants and which may damage seeds stored in the soil.

### **PROJECTED IMPACTS OUTSIDE EXISTING OIL FIELDS AND WITHIN AREAS OF HIGH OR MODERATE OIL AND GAS POTENTIAL**

Sixteen acres of public lands are projected to undergo severe surface disturbance resulting from oil and gas construction activities and there is a less than 5% chance 55 additional public acres will be so disturbed.

An additional 180 acres is projected to be impacted by relatively light surface disturbance resulting from seismic exploration.

Impacts to native vegetation due to oil and gas related activities outside existing oil fields are similar to those expected to occur within oil fields as discussed in the previous section. Additional vegetation concerns outside existing oil fields involve the possibility of impacts to oak woodland, wetlands, riparian areas, sand dune communities, and perennial grasslands. Proper mitigation (see mitigation section below) in most cases will serve to avoid impacts to these plant communities.

### **Cumulative Impacts**

The extensive impacts which have occurred in habitats of special concern such as oak woodlands are discussed in the Affected Environment chapter. These impacts are expected to continue on private lands and therefore any remaining pockets of these habitats on public lands will become even more important in the future. A total of 1,000 acres of public lands in the Hollister Resource Area are projected to be affected by oil and gas operations (see Total Affected Acres in Table 9) prior to the year 2006. The portion of this 1,000 acre total which actually contains any one of the several specialized habitats of concern will be something far less than 1,000 acres. This low amount of acreage in addition to the fact that most projected

activity is expected to occur within existing oil fields where little of these habitats remain, limits the chances for overlap between future areas of oil and gas development and the location of these habitats which merit protective management. Where overlap does occur mitigation measures described below should avoid or minimize potential impacts to these habitats.

### **Mitigation Measures**

When losses occur to specialized habitats because they can not be avoided then reclamation of those habitats would be required of the lessee.

Prior to any topsoil removal topsoil would be removed, stockpiled, and protected from erosion for use in future reclamation. This includes the removal of topsoil before the establishment of sumps or other oil and gas related facilities.

Upon termination of operations for any given area stockpiled topsoil would be distributed evenly over the disturbed area.

Reclamation needs, as determined by BLM, could include the purchase of native plant seed or seedlings and the revegetation of these habitats until they are once again self-sustaining.

### **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANT SPECIES**

The special status species in Tables 3 and 4, with the exception of the Carmel Valley bushmallow, are all annual forbs which may lie dormant during dry years. Adequate surveys to identify existing populations can often be conducted only during the short blooming season in years when moisture conditions are conducive for germination and flowering. During prolonged drought the start up of new surface disturbing oil and gas operations may need to be delayed up to several years in order to ensure that special status plant species do not exist on site or will not be severely impacted or eliminated by the operations. However, all of the existing oil and gas leases within the Hollister Resource Area were issued before any local plant species were listed by the U.S. Fish and Wildlife Service as endangered or threatened. Therefore these leases only include standard terms and conditions which may not be sufficient to delay startup of oil and gas operations long enough to ensure that special status plant populations are not adversely impacted. Therefore, impacts to special status plants may occur on lands already leased. Under this alternative new leases would not include stipulations that allow for delays in oil and gas related operations, therefore populations on these new leases could also be threatened.



Oil and gas operations could affect special status plants directly by crushing or uprooting them with vehicles or exposing them to spillage or exhaust of toxic substances. Oil and gas operations can indirectly adversely impact special status plants by destroying the soil matrix during construction activities (which reduces available soil oxygen and water), contaminating the soil with oil products, aiding the establishment or spreading of competing weed species, and by clogging their reproductive parts with dust generated by vehicles or construction.

## **CALIFORNIA JEWELFLOWER - CAULANTHUS CALIFORNICUS**

Five hundred of the 600 public acres projected to be severely disturbed by oil and gas operations are in the Coalinga, East Coalinga, and San Ardo Oil Fields. There are no historical C. californicus populations in these fields and results from recent field inventories indicate there is only a remote possibility for C. californicus to currently exist in these fields. Therefore, it is unlikely that this species will be impacted in these areas by future oil and gas operations.

The remaining 100 acres of projected surface disturbance within existing oil fields could impact unknown populations of the California jewelflower and potential habitat for it depending on the location of disturbance. The projected 140 acres of disturbance resulting from seismic exploration at unknown locations within existing oil fields could also impact this species. These impacts have the highest potential to occur in three areas. Five historical populations of the jewelflower are known within a few miles of the Jacalitos Oil Fields. Also, suitable habitat for this species remains on public lands in the Jacalitos Hills within two miles of the recently discovered Kreyenhagen Hills' populations of C. californicus. There is a moderate chance for the California jewelflower to occur in the Kettleman Hills thus any future disturbances in the Kettleman North Dome Oil Field could also impact this species.

In areas of high or moderate oil and gas potential outside existing oil fields 16 acres are projected to be severely disturbed by oil and gas operations. There is a less than 5% chance an additional 55 acres will also be so disturbed. Relatively light disturbance is expected to occur on 180 acres in these high potential areas due to seismic exploration. All of the projected disturbances mentioned in this paragraph could impact the California jewelflower depending on their location. One high potential oil and gas area is the Kreyenhagen Hills which contains populations of the jewelflower and substantial potential habitat. Oil and gas disturbances in these hills could critically impact this species.

## **Cumulative Impacts**

Most of the California jewelflower's prime and original habitat (the sandy floor of the San Joaquin Valley) has been irreversibly altered by conversion of lands to agricultural uses, urban development, and development of oil and gas fields. Other habitat areas have been degraded by the invasion of highly competitive introduced species. Livestock grazing may

have an especially deleterious affect on the California jewelflower because it occurs (often intensively) on nearly all remaining potential habitat of the California jewelflower (both private and public) and because cattle appear to highly favor this species for forage. Continued demands on remaining habitat for urban and rural development is also expected to result in additional losses of suitable habitat and unknown populations of the California jewelflower.

Because these development pressures will be most intense on private lands, the long-term preservation of these species may be dependent on the maintenance and expansion of populations on federal, state, and other protected lands. Placed in this perspective, it is apparent that adverse impacts to populations of the California jewelflower and its habitat on public lands could jeopardize its survival. Because of the existing circumstances Federal and State resource agencies responsible for management of endangered and threatened species have adopted a policy of "no net loss" of habitat for threatened and endangered species' native to the San Joaquin Valley region.

## **Mitigation**

Individuals holding oil & gas leases on parcels with known populations or potential habitat for this species should be notified that lengthy delays in processing permits may occur if botanical inventories are not completed during appropriate seasons. To avoid future conflicts between "lease development rights" and compliance with the Endangered Species Act, individuals holding leases in habitat for these T&E species should be encouraged to have comprehensive inventories completed during the next available window of opportunity when growing conditions are satisfactory.

Authorization for destruction of potential habitat should require acquisition of off-site habitat lands of comparable or better potential for supporting reintroduction of these species. Ownership of these off-site lands should be transferred to the BLM for use during future species reintroduction efforts.

Issuance of new O&G leases within known and potential habitat of T&E species should be deferred until comprehensive botanical inventories have been completed to determine the location and extent of populations.

Exploratory drilling operations on unoccupied potential habitat should be required to use self-contained units to eliminate the need to construct sumps and to minimize spillage of petroleum products.

Oil & gas operators should be advised not to disturb any new areas during reclamation activities associated with abandonment of facilities in the Jacalitos and Kettleman North Dome oil fields.



When losses occur to potential special status species habitat because they can not be avoided, then reclamation of that habitat should be required of the lessee.

Prior to any topsoil removal topsoil should be removed, stockpiled, and protected from erosion for use in future reclamation. This includes the removal of topsoil before the establishment of sumps or other oil and gas related facilities.

Upon termination of operations for any given area stockpiled topsoil should be distributed evenly over the disturbed area.

Reclamation needs, as determined by BLM, may include the purchase of native plant seed or seedlings and the revegetation of these habitats until they are once again self-sustaining.

### **SAN JOAQUIN WOOLLY-THREADS - LEMBERTIA CONGDONII**

The San Joaquin woolly-threads is more likely than the California jewelflower to be impacted by future operations in existing oil fields. L. congdonii currently exists in the Jacalitos Hills and Kettleman North Dome Oil Fields, occasionally within a few hundred feet of on-going operations (BLM-Hollister files). According to Taylor (1989), past observations suggest that L. congdonii has some ability to colonize sites which have had past soil disturbances, including on former grain fields and areas subjected to prior surface grading. Past observations also suggest however that nearby L. congdonii populations may be needed for this species to recolonize formerly disturbed sites. The current and historical range of L. congdonii includes the western foothills of the San Joaquin Valley as far north as Panoche Creek whereas the California jewelflower is currently known only as far north as the Kreyenhagen Hills.

The above facts suggest that the entire 1,000 acres of public lands projected for oil and gas activities (except those in the San Ardo and outer coastal ranges) have some potential to impact the San Joaquin woolly-threads. Areas within the Hollister Resource Area in which this species could be most affected by oil and gas operations would be those areas currently occupied, especially the Jacalitos Hills and the Kettleman Hills, both of which have several L. congdonii populations.

### **Cumulative Impacts**

The cumulative impacts to the San Joaquin Woolly-threads are very similar to those discussed above for the California jewelflower. Livestock grazing however, probably has less of an impact on the San Joaquin woolly-threads than the California jewelflower since livestock do not seem to prefer the San Joaquin woolly-threads over other species. On a couple of occasions both cattle and sheep have been observed avoiding L. congdonii as a forage species. However it is not known how livestock may adversely or beneficially impact this species in

other ways such as by trampling of L. congdonii individuals or reducing competition to L. congdonii by foraging on grasses and other annuals. There are also many more populations of the San Joaquin woolly-threads than of the California jewelflower on public lands. For these reasons the cumulative impacts to the San Joaquin woolly-threads appear to be less than those projected for the California jewelflower.

## Mitigation

Refer to the mitigation listed above for the California jewelflower.

## HOOVER'S WOOLLYSTAR - ERIASTRUM HOOVERI

Like the San Joaquin woolly-threads, Hoover's woollystar currently grows within the Kettleman North Dome and Jacalitos Hills Oil Fields . The two species share similar ranges and habitats (at least in one location they are found growing alongside one another). Like the San Joaquin woolly-threads, Hoover's woollystar has also been observed growing on formerly disturbed sites. Because of these similarities, impacts from future oil and gas operations on Hoover's woollystar are projected to be the same as those discussed above for the San Joaquin woolly-threads.

As discussed in Chapter Three there are only two known populations of E. hooveri on public lands within the Hollister Resource Area (though there are several populations of woolly-stars that have not yet been confirmed to be Hoover's woolly-star) and one of those occurs within the Jacalitos Hills Oil Field. Therefore at least at the present time oil and gas operations are a significant threat to this species in the Hollister Resource Area. Being one of the more northerly populations of Hoover's woolly-star this population could be of additional significance as it may contain genotypes (genetic strains) not found in the southern portion of its range.

## Cumulative Impacts

Impacts to Hoover's woolly-star are expected to be similar as those discussed above for the San Joaquin woolly-threads. However, because there are many more populations of Hoover's woolly-star than the San Joaquin woolly-threads on private and public lands throughout the range of these species', impacts to Eriastrum hooveri from oil and gas operations will probably be less significant than impacts to Lembertia congdonii.

## Mitigation

Refer to the mitigation listed above for the California jewelflower.



## OTHER SPECIAL STATUS PLANT SPECIES

Four of the five remaining special status species likely to be impacted under Alternative A are federal candidate 2 (C2) species (see footnote to Appendix D for explanation of the C2 category). These species are addressed below.

The Carmel Valley bushmallow (Malacothamnus palmeri ssp. palmeri) and the one-awned spineflower (Chorizanthe rectispina) occur in chaparral and may be impacted by oil and gas operations in the San Ardo area.

The forked-fiddleneck (Amsinckia furcata) is usually found in very restricted habitats and these areas may be impacted by future oil and gas development, especially in the Coalinga and East Coalinga Oil Fields.

Hollisteria (Hollisteria lanata) is found in similar habitats as the three threatened and endangered species discussed above, (Caulanthus californicus, Lembertia congdonii, and Eriastrum hooveri). Hollisteria also occurs in additional habitats which do not support these listed species (such as gravelly roadsides). Thus, impacts to hollisteria from oil and gas development are expected to be similar to impacts on the listed species above within their habitats. However these impacts are not expected to be as significant to hollisteria because hollisteria does occur in a wider diversity of available habitats.

Panoche peppergrass, which has no official special status designation merits similar protection to that afforded special status plants discussed above. This species could be affected by oil and gas development, especially near Vallecitos Valley which is the only moderate to high oil and gas potential area known to support Panoche peppergrass.

## Mitigation

Measures listed in Chapter Two to protect special status plant species are expected to be sufficient to minimize oil and gas related impacts to Panoche peppergrass and the above four Candidate 2 species.

## SPECIAL STATUS PLANT SPECIES WITH MODERATE POTENTIAL TO BE IMPACTED BY OIL AND GAS DEVELOPMENT (see Table 4)

The limited data on the distribution, ecology, and biology of the three plant species listed in Table 4 is insufficient to make a conclusive assessment of potential impacts to these species from future oil and gas development. However, protective measures listed in Chapter Two are expected to be sufficient to minimize impacts to these species.

## **WILDLIFE**

Continued development in the oil fields would result in the destruction of about 450 acres of wildlife habitat and a temporary disturbance of an additional 150 acres of habitat. Most of this disturbance would be in annual grasslands where the predominant vegetation is non-native annual grasses. Much of this area has already been disturbed by existing oil & gas development activities and many species that are not able to coexist with oil & gas development have probably already been eliminated from the area. Potential impacts to threatened or endangered species found in these areas is discussed under a separate heading in this chapter.

In addition to eliminating wildlife habitat, development of new wells in the oil fields would also result in the construction of new oil or water disposal sumps which historically have been a hazard to birds and small mammals. Current BLM procedures, however, require that all sumps and tanks are covered with screens to prevent entry by birds or small mammals (CWRCB 1975).

Disturbance resulting from unsuccessful wildcat exploration wells outside the developed fields would result in the temporary displacement of wildlife on as many as 120 acres of habitat. Most of this activity would probably occur in annual grasslands where the major focus is on threatened or endangered species habitat. Upland game birds could be affected if pockets of saltbush which provide cover are destroyed. Standard mitigation however is expected to preclude the destruction of these specialized habitats. Some wildcat wells could also be drilled in chaparral habitats. Deer populations and other wildlife species in these areas are currently limited by the lack of water and the prevalence of over-mature brush stands. If exploration wells are located in open areas or juvenile brush fields near water sources, then deer and other wildlife could be denied these critical habitats. Impacts would be most severe during drought years or the fawning season. The drilling of unsuccessful exploration wells located in over-mature brush fields away from existing water sources could benefit deer and other wildlife by creating new open grassland or juvenile brush habitats. However the term of benefit would depend on seasonal rates of dense brush reestablishment (three to five years).

These new habitats would be particularly valuable if reclamation resulted in the establishment of native perennial grasses that would maintain the open areas for longer periods of time.

Substantial benefits could occur to numerous wildlife species if an unsuccessful wildcat well resulted in the discovery of usable water which could be developed as a source of water for wildlife. Wells located on hills or other prominent elevations could have the potential to provide new water sources for wildlife in several thousand acres of habitat. These same new water sources, however, could be detrimental to wildlife populations if they result in expanded domestic livestock grazing and increased competition between livestock and wildlife.



If a wildcat exploration well is successful and a new oil field is discovered, then there could be a permanent loss of an additional 55 acres of wildlife habitat. If the discovery is in annual grassland habitat areas, the disturbance could preclude the use of some areas by upland gamebirds. Habitat for several threatened or endangered species could also be affected and are discussed in a separate section of this chapter. If the new oil field was discovered in the Williams Hill area, then there could be a permanent loss of 55 acres of habitat of the Santa Lucia deer herd.

Geophysical exploration activity would only have a minor impact on wildlife species which would be limited to displacement of species from some habitat areas for one to ten days.

### **Cumulative Impacts**

Cumulative impacts to species adapted to annual grasslands, which includes most of the developed oil fields, are discussed in the Threatened, Endangered and Other Special Status Animal Species section of this chapter. Habitats on public lands are expected to have continued impacts from livestock grazing and increases in recreation use. Estimates are that at current levels of development most annual grassland/shrub habitats in the San Joaquin Valley will be destroyed by 1996 (USFWS 1985).

The only other action affecting chaparral habitats on public lands is the BLM's prescribed fire program. Controlled fires are being set in chaparral habitats, including Williams Hill, to reduce fire danger and improve wildlife habitat. Controlled fires are also being used on private lands to reduce fire danger and to improve livestock grazing conditions. Many local livestock ranches have diversified and are now becoming dependent on revenues from hunting of game animals, including guide services and charging hunters for access to wildlife habitats. This trend is expected to provide an economic incentive for protection and enhancement of wildlife habitats on private lands.

### **Mitigation Measures**

Conduct inventory of all federal lease operations to assure that all sumps and tanks are covered with screening.

Where the location of exploratory wells indicates they could be developed as a needed source of new wildlife waters, require that operators provide the BLM an option to develop unsuccessful wells for wildlife enhancement purposes. Protect new water sources from livestock, except when better livestock distribution would enhance more critical wildlife habitat in other portions of the grazing allotment.

For mitigation specific to annual grasslands, see measures under the threatened and endangered species portion of this chapter.

The following mitigation measures apply to chaparral habitats:

Require that exploratory wells be moved at least 200 meters from water sources, and encourage placement on dense chaparral sites rather than existing grassland or juvenile brush sites.

Require reseeding with native perennial grass species wherever feasible.

If a new oil field is discovered, require off-site mitigation for the loss of wildlife habitat. Suggested off-site mitigation would be to provide funding for controlled burns to create new habitat in existing over-mature brush fields.

Consider closure of new roads to reduce the risk of illegal harvest.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMAL SPECIES**

### **SAN JOAQUIN KIT FOX**

There could be a long-term loss of up to 505 acres of habitat and temporary disturbance of up to 490 acres of habitat. It is anticipated that there would be direct mortality to some individuals from vehicle traffic and spills of contaminated waste waters or petroleum products. There should be no impact from collapsed burrows since mitigation in the existing ACEC plan would prohibit any surface occupancy in a 200' buffer zone around all active or inactive dens. However, kit foxes may be adversely impacted by the movement and removal of oil field pipe that provides den sites for many foxes inhabiting oil fields. Additional, artificial feeding and foraging of trash may reduce kit fox health and vigor through poor nutrition. Feral and domestic dogs have also been documented to cause kit fox mortality.

Most of the impacts would occur from loss of hunting habitat in the existing oil fields. Kit fox currently occurs in low numbers within the existing oil fields where much of the habitat has already been degraded. Kato and O'Farrell (1985) found that a project in areas where 50-60% of the habitat had already been disturbed would have a greater impact on the species than a comparable project in undisturbed habitat. Other studies have indicated that areas of moderate oil development have a good potential to support kit fox as long as suitable mitigation policies are observed (O'Farrell et. al., 1980, 1984). The existing low numbers of kit fox in the oil fields may be the result of a combination of marginal natural habitat combined with a long-term historic disturbance by oil industry activity. Because the existing



populations numbers are at low levels, any additional disturbance of occupied habitat in these areas and incidental mortality of individuals could jeopardize these remaining populations.

Activities outside the existing oil fields would be limited to temporary disturbance resulting from exploration activities, and a less than 5% possibility that there would be long-term disturbance of up to 55 acres from the development of a small oil & gas field. While these activities would result in the loss of habitat and could result in prey loss and in mortality to some individuals, the studies cited above would indicate that with appropriate measures the populations would not be jeopardized. Further supporting this conclusion are additional studies by O'Farrel (1984) of recent oil activity in the Elk Hills National Petroleum Reserve. These studies documented kit fox density, reproduction, dispersal, and mortality were similar in developed and undeveloped areas of the reserve.

### **Cumulative Impacts**

The major other activities that occur in kit fox habitat on public lands are livestock grazing and recreation. Light to moderate livestock grazing is thought to be compatible with kit fox, however the indirect and long-term effects of grazing on kit fox are not well understood. Heavy intensity grazing is adverse to maintaining kit fox habitat. Most recreation use in kit fox habitat is hunting of upland game and off-highway-vehicle (OHV) driving. While vehicles are limited to designated roads within kit fox habitat, trespass vehicle use in closed areas is a continuing problem. The demand for recreation use of public lands in this region is expected to continue to grow in response to increased urban population pressures, and limited opportunities on private lands for outdoor recreation. Increased recreation use resulting from the development of new access routes into kit fox habitat in conjunction with oil & gas activity could result in additional disruption of habitat and mortality of individuals.

Ninety-three percent of the natural habitat of this species has already been destroyed primarily by conversion to agricultural lands and urban/rural development. As the population of California increases, continued demands for more lands for development and for recreation are expected to result in the loss of additional habitat areas on private lands. The U.S. Fish & Wildlife Service has estimated that at current rates of development, all San Joaquin Valley habitat on private lands would be destroyed by 1996 (USFWS 1985). Because of these trends, the Federal and State wildlife agencies responsible for management of endangered species have adopted a policy of "no net loss" of habitat for T&E species native to the San Joaquin Valley.

### **Mitigation**

All mitigation measures in the Panoche/Coalinga Area of Critical Environmental Concern (ACEC) Plan (see Appendix C) should be vigorously enforced.

Wherever possible, all vehicle use should be restricted to existing roads in occupied kit fox habitat. New roads should be limited to the minimum necessary in both potential and existing habitat, with unneeded roads closed to public use and reclaimed.

Development of new oil & gas fields should be limited to one pad per 40 acres to limit the amount of habitat destroyed and the number of new roads needed.

Exploratory drilling in T&E habitat should be required to use self-contained units to eliminate the need to construct sumps and to minimize spillage of petroleum products.

Authorization for destruction of occupied habitat within the developed oil fields should require acquisition of off-site habitats supporting comparable populations. Ownership of these off-site lands should be transferred to the BLM for dedication to endangered species habitat management.

Rehabilitation of abandoned well sites could be used in lieu of acquisition of off-site mitigation lands, but only if studies indicate that kit fox have successfully recolonized previously uninhabited abandoned well sites.

Site-specific conditions for well abandonment operations within kit fox habitat should give priority to maintaining and/or establishing habitat for this species. Artificial denning structures should be used when abandonments are adjacent to occupied habitat areas.

Inventories should be conducted in the existing fields and in any areas of new development to verify the severity of impacts to kit fox populations from incremental development. Inventories should follow procedures developed by the California Department of Fish & Game (1990).

There should be careful survey of pipes prior to removal or movement to assure they are not being used by kit fox.

Trash should be contained in adequate facilities to assure no scavaging by kit fox.

Vehicle speed limits should be set low to reduce the probability of mortality from vehicle traffic.

Free roaming dogs should not be permitted.

## **BLUNT NOSED LEOPARD LIZARD**

There could be a long-term loss of up to 505 acres of habitat and temporary disturbance of up to 490 acres of habitat. It is anticipated that there would be direct mortality to some



individuals from vehicle traffic, collapsed burrows resulting in suffocation, and spills of contaminated waste waters or petroleum products.

Most of the impacts would occur in the existing oil fields. While studies by Chesemore (1979) and O'Farrell & Kato (1980) indicate that this species is compatible with certain intensities of oil development, it is not clear how much development can occur before loss of populations would occur. Chesemore indicated that heavy development in the oil fields would ultimately result in the loss of the species. Increased development in the Coalinga fields could result in some loss of populations. The potential for loss of populations could be offset by colonization of properly rehabilitated abandoned areas by new individuals. This species has been observed in abandoned production areas undergoing natural revegetation.

Exploration and development activities outside the developed oil fields are not expected to threaten existing populations. However, loss of individuals from entrapment in burrows, vehicle strikes, and contaminants are possible. Additional studies by Kato & O'Farrell (1985) also indicate that low intensity activities have a benign impact on the species. Existing ACEC guidelines would prohibit surface occupancy within 100' of dry washes in blunt-nosed leopard lizard habitat.

### **Cumulative Impacts**

Because blunt-nosed leopard lizards occupy comparable habitats and are subject to similar threats, cumulative impacts are the same as previously discussed for the San Joaquin kit fox.

### **Mitigation**

Most mitigation measures discussed for the San Joaquin kit fox would also be appropriate for blunt-nosed leopard lizard habitat. The construction of artificial burrows, however, would not be necessary for blunt-nosed leopard lizard habitats.

Within blunt-nosed leopard lizard habitat, construction should be scheduled during periods of the year when the lizards are active and temperatures are between 75 and 105 degrees Fahrenheit.

Road berms should be avoided during road maintenance and construction with burrows hand excavated to allow animals to escape prior to destruction of the berms.

## **GIANT KANGAROO RAT**

Prime habitat for this species does not occur in the developed oil fields. Continued development of the oil fields is not expected to affect giant kangaroo rat.

This species could be affected by the potential long-term disturbance of 55 acres from the development of a new oil & gas field, and temporary disturbance of up to 195 acres from exploration activities. Existing ACEC guidelines would require that a minimum buffer zone of 200' be maintained around all giant kangaroo rat colonies. Some direct mortality of giant kangaroo rats could still occur from vehicle traffic. These impacts are not expected to affect the overall populations if ACEC restrictions are rigidly followed. Indirect impacts could also occur from increased recreational vehicle traffic and camping if oil & gas development creates new vehicle access routes into habitat areas.

### **Cumulative Impacts**

Habitat areas on federal lands are impacted by livestock grazing and recreation use. Studies by Williams (1989) indicated that livestock grazing did not appear to have a noticeable impact on giant kangaroo rat population density. Damage however has been documented in the Panoche area from sheep bedding on giant kangaroo rat colonies. Increased recreation use could result in localized damage to colonies from trespass off-road vehicle use and camping.

This species currently occupies less than three percent of its historic range. Five relatively small areas totalling 12 square miles remain that support population densities typical of those existing prior to 1950. Many of the remaining populations consist of only a few individuals widely separated from other populations. Because its habitat requirements are even more restricted than the kit fox or blunt-nosed leopard lizard, development pressures are even more likely to result in destruction of remaining habitat areas on private lands in the San Joaquin Valley.

### **Mitigation**

Avoidance of giant kangaroo rat precincts and the 200 foot buffer should be adequate to protect these species. Most mitigation measures discussed for the San Joaquin kit fox would also be appropriate for giant kangaroo rat habitat. The construction of artificial burrows, however, would not be necessary for giant kangaroo rat habitats.

## **SAN JOAQUIN ANTELOPE SQUIRREL**

The San Joaquin antelope squirrel generally occupies similar habitats as the blunt-nosed leopard lizard. Impacts would generally be similar to those described for the blunt-nosed



leopard lizard. However, this species is more dependent on shrub cover and will often use burrows on the side of road cuts and berms.

## **Mitigation**

Shrub cover at a light to moderate density should be included in the rehabilitation design.

Road berms should be avoided during road maintenance and construction with burrows hand excavated to allow animals to escape prior to destruction of the berms.

## **WATER QUALITY/EROSION**

### **SURFACE WATER/EROSION**

Construction of oil production facilities would create a long-term disturbance of soil and vegetation of up to 505 acres increasing the potential for soil erosion. Additional erosion could also occur on about 150 acres disturbed by unsuccessful exploration wells. Most of this activity is expected to occur in or adjacent to the Coalinga oil fields where slopes are generally less than 20% and the soil erosion potential is low or moderate.

Mitigation measures described in Chapter Two to protect water quality (page 17) are expected to minimize any impacts to water quality resulting from increased sedimentation or erosion. These measures, which apply to all alternatives, include use of the Surface Operating Standards for Oil and Gas Exploration and Development (RMRCC 1989), and requirements that detailed engineering studies be submitted with proposals for development on slopes that exceed 10%.

The Surface Operating Standards for Oil and Gas Exploration and Development guidelines were developed by a Forest Service/Bureau of Land Management interagency task force. The guidelines contain detailed engineering designs to assure that road construction, drainage crossings, drilling pad sites, and production facilities are all constructed with good engineering practices. Use of these procedures are expected to minimize any sedimentation or erosion on slopes below 10% where erosion hazards are generally considered low.

On slopes above 10%, requiring studies by certified engineers would assure that proposed roads and other developments were designed to preclude slope failure or off-site transport of sediments. Application of this requirement for any surface disturbance in the Moreno formation is expected to preclude any accelerated erosion of selenium-bearing sediments.

These procedures are consistent with Best Management Practices (BMPs) contained in the Central Coast Region Water Quality Control Plan (CSWRCB 1990) for protection of water

quality during land disturbing activities, and are consistent with procedures established by local counties (Monterey County 1987; FCPC 1980).

No impacts to surface water are expected to occur from flooding or high runoff events since BLM procedures require that all oil storage or waste facilities be located away from established drainage patterns (EPA 1986).

## **SURFACE WATER/OIL SPILLS**

It is anticipated that there would be one oil spill in the range of 5,000 to 20,000 barrels or more during the 15 year life of this plan (Milliken 1990c). A spill of this size in the Vallecitos oil field could have a serious long-term impact on water quality in the Silver Creek drainage making the water unusable or unhealthy for wildlife or livestock use. Protecting the quality of water in this drainage is important because it is a major water source for several endangered or threatened animal species.

Oil & gas operators are required to notify the BLM immediately whenever more than 100 barrels of oil are spilled in an incident. Containment dikes must be constructed around all storage facilities. These containment dikes must have sufficient volume to contain, at a minimum, the entire content of the largest tank in the facility.

## **GROUNDWATER**

No contamination of groundwater resources is expected to occur if standard operating procedures are followed. These standard operating procedures cover well casing requirements, subsurface disposal of wastes, use of pits for oil or produced water, spill contingency plans, and abandonment procedures.

BLM procedures require that surface casing be set 200 feet below the deepest fresh water aquifer that could reasonably be developed for use. The casing is a string of steel pipe which, when properly installed and cemented, protects aquifers from being contaminated by drilling and oil production operations.

Historically groundwater below many oil fields has been impacted by percolation of oil field wastewater from unlined sumps (EPA 1986). California code and BLM procedures now prohibit the use of unlined sumps where there is any potential to impact groundwater aquifers (SWRCB 1975; EPA 1986). Leak detection systems are required for all lined pits to assure the pits are functioning properly.



In addition to abiding by stringent federal procedures, operators of leases on federal lands are also required to get appropriate permits from the California Division of Oil & Gas (CDOG) before commencing drilling activities on federal leases. In 1988 a Memorandum of Agreement was signed by the California State Water Resources Control Board and the California Department of Conservation, Division of Oil & Gas (DOG) to establish coordinated permit and review procedures to assure that oil & gas operations do not cause degradation of groundwater resources (CSWRCB 1990).

In the current Water Quality Control Plan for the Central Coast District, the Regional Water Quality Control Board concurred that existing procedures are satisfactory to protect groundwater resources from contamination by oil & gas exploration or development activities (CSWRCB 1989).

### **Cumulative Impacts**

Regional Water Quality Control Plans (CSWRCB 1989 & CSWRCB 1990) have been developed by the regional water quality control boards to deal comprehensively with all potential sources of surface or groundwater contamination. The Bureau of Land Management, U. S. Forest Service, and CALTRANS have all signed agreements with the State Water Resources Board which designates these agencies as responsible for implementing Best Management Practices (BMPs) on lands under their jurisdiction (CSWRCB 1989). The implementation of these agreements, and the Regional Water Quality Control Plans, are expected to assure that the cumulative impacts of the numerous actions that could affect water quality do not result in unacceptable degradation of water quality.

### **Mitigation Measures**

Conduct inspections of all federal leases in the Vallecitos oil field to assure that containment dikes are sufficient to prevent additional spills in Silver Creek. Review transportation plans and pipelines to see if additional mitigation measures may be appropriate to minimize the potential for a major spill into the Silver Creek drainage.

Conduct an inventory of sumps on federal lands to assure that all sumps located in natural drainages have been removed.

Conduct an inventory of sumps on federal lands to assure that all sumps with potential to contaminate groundwater resources have been lined and are fitted with leak detection systems.

## **VISUAL RESOURCES**

This alternative is a continuation of existing management and policies. The standard lease terms providing for the application of reasonable measures to protect visual resources would apply. The application of standard mitigation measures would be sufficient to preclude any loss of visual resource values in areas with moderate O&G potential, and with moderate or low visual sensitivity. Described below are those areas with high O&G potential or areas that are particularly sensitive to modification of scenic landscapes.

### **EXISTING OIL FIELDS**

The extensively developed fields around Coalinga, Avenal and San Ardo would not have any significant impact from additional leasing and development. In the Vallecitos Field, wells and related facilities are scattered with only a few being readily visible from New Idria Road. Abandonments in this area are expected to exceed new development within the oil field. Scenic quality would be improved as old decrepit oil facilities are removed, and replaced with new facilities that would be painted to blend in with the surrounding environment. Scenic quality would also be improved in the Kettleman North Dome, Jacalitos, and other Coalinga fields where most activity is expected to be abandonment and reclamation of existing production facilities.

### **HIGH-MODERATE O&G POTENTIAL AREAS**

#### Interstate 5 Corridor

The construction of well pads and access roads for drilling exploratory wells could create permanent scars on the landscape that would be readily visible from the I-5 corridor.

The discovery of a new oil & gas field within the foreground or middleground viewshed of I-5 could transform up to 160 acres of the existing natural appearing environment into a developed semi-industrial setting with the potential for numerous scars on the highly visible slopes.

#### Williams Hill

Visual resources along highway 101 are mostly background views with some areas in the foreground and middleground. Vegetative screening and painting facilities to blend in with the surrounding landscape would mitigate visual impacts of most



development facilities. Scars caused by road cuts on steep slopes however, could be highly noticeable in many areas due to the steep topography.

### Pinnacles Area

Visual resources around the Pinnacles National Monument are mostly foreground and middleground views. The area is undeveloped except for a few ranch roads and related facilities.

Exploration activities in the viewshed of the monument could create scars on the landscape that would be readily visible to park visitors. The impact of these scars would be partially mitigated by the area policy requiring engineering studies and reclamation plans before slopes above 10% are disturbed.

The discovery of a new oil & gas field, and subsequent development within the park foreground or middleground viewshed, would dramatically transform the existing natural and rural vistas into a semi-industrial setting. This degradation of scenic values would diminish the recreational experiences of park visitors who would view this landscape from numerous vistas on the park trail system.

### **Cumulative Impacts**

Continued development of oil production facilities on both private and federal lands in the Coalinga and San Ardo oil fields is not expected to change the existing visual landscape which is already dominated by oil production facilities. Abandonment of existing wells and production facilities on private and federal lands in the Kettleman North Dome and Jacalitos fields has the potential to transform these existing oil fields into a natural appearing landscape. The extent of this transformation will depend on the successful implementation of total clean-up of abandoned O&G lease operations on both federal and private lands.

No other actions are anticipated on federal lands that would affect vistas from the I-5 corridor. There are, however numerous development pressures on private lands that are visible from the corridor. Between Altamont and Pacheco passes, there are seven major developments of 600 acres or more currently proposed for the foothills west of I-5, including one proposal for development of a new community and destination resort on 30,000 acres (Houston 1990). These proposals on private lands would indicate that most natural vistas of annual grassland foothills from I-5 could be transformed into suburban developments within the life of this plan. Federally owned annual grassland foothills could become the only natural vistas remaining on the I-5 corridor between Sacramento and the Grapevine.

There are no other actions known or projected that could affect scenic values in Williams Hill or in the eastern viewshed of Pinnacles National Monument.

## **Mitigation Measures**

### Existing Oil Fields

Develop comprehensive plans for abandonment of non-producing leases to assure that all contours are restored to natural appearances, all machinery and debris is removed, all contamination by hazardous materials is cleaned-up, and denuded areas are revegetated with natural appearing vegetation.

### I-5 Corridor

Require that all access roads follow contours and be constructed on slopes that are not visible from the foreground or middleground viewshed of I-5.

Limit production facilities on leases to one pad per 40 acres encouraging the installation of multiple wells per pad. Encourage location of the pads in areas that are not visible from the foreground or middleground viewshed of I-5.

Require the use of low-profile production facilities and painting of all facilities to match natural landscape colors.

### Williams Hill

Require that all access roads follow contours and avoid routes visible from major roads. Require complete rehabilitation of all road cuts.

### Pinnacles Area

Require that access roads avoid Pinnacles viewshed whenever possible.

Require the use of low-profile production facilities and painting of all facilities to match natural landscape colors.

## **OIL AND GAS RESOURCES**

Currently there is an established oil and gas industry in the resource area with producing oil and gas fields. Producing wells on federal leases account for only 2% of the producing wells in the resource area. It is anticipated that the development of new oil wells would be



partially offset by abandonment of existing wells. On federal lands a net increase of about 25 wells is expected during the next 15 years.

Exploration and development activity on federal leases within the producing fields is not expected to have a significant impact on local or regional economies. Drilling crews generally are based in Kern County. Most oil field maintenance crews are located in the Coalinga area. No major changes in drilling, production, or exploration activity rates are projected during the next 15 years (Milliken 1990c).

There is a less than 5% chance that a new oil or gas field could be discovered on public lands during the 15-year projected life of this plan. If a new field was discovered, it is anticipated that its reserves would be between 200,000 and 1,000,000 barrels (Milliken 1990c). This compares with current existing reserves within producing fields in the resource area which are estimated at 288,979,000 barrels (Milliken 1990c) and current California known reserves which are estimated at 5.9 billion barrels (CCCOP 1989).

Environmental constraints on oil & gas exploration are not expected to affect the level of exploratory drilling activity. The recent historical trends in exploratory drilling activity appears to be primarily responsive to changes in the price of oil (Milliken 1990c). Areas not available for oil & gas leasing under this alternative have no potential for the discovery of oil & gas resources (Milliken 1990a).

## **ALTERNATIVE "B" - NO LEASING**

### **REASONABLY FORESEEABLE DEVELOPMENT SCENARIO**

There would be no new leasing under this alternative. Oil & gas exploration and development activities on existing leases however would continue to occur until expiration or abandonment of the leases. Oil & gas exploration and development activities anticipated during the next 15 years under this alternative are summarized below and in Table 10:

#### **Within Existing Developed Oil Fields**

- A) All federal lands within the developed oil fields are already under lease. These leases remain in effect as long as oil is being produced. The leases are not expected to expire during the 15 life of this plan. Development activities

in the oil fields are expected to be the same as described for the Current Management Alternative (Alternative "A").

#### **Within Areas With High or Moderate Oil & Gas Potential**

- A) About 30% of this area is currently under lease. Unless economic quantities of oil or gas was discovered, most of these leases would expire within the next five to six years. The most probable scenario is that one or two unsuccessful wildcat wells would be drilled resulting in a temporary disturbance of two to five acres. These areas would be reclaimed following completion of the drilling activities.
- B) There could also be additional temporary disturbance of about 40 acres from seismic explorations. These explorations can be authorized in areas that are not available for oil and gas leasing. It is anticipated that some seismic operations would continue to be conducted on federal lands since this information would be valuable in predicting the location of oil & gas fields on adjacent private lands.
- C) Termination of oil & gas leasing on federal lands is not expected to affect the level of oil & gas exploration and development activities on private lands. These activities would occur as described for the Current Management Alternative (Alternative "A").

#### **Within Areas With "No" Oil and Gas Potential**

- A) There would be no oil and gas exploration or development in these areas since they are not currently leased and would not be available for leasing.



**TABLE #10**  
**ALTERNATIVE "B"**  
**SUMMATION OF AFFECTED ACRES**

<u>O&amp;G POTENTIAL</u>	<u>EXPLORATION TEMPORARY IMPACTS</u>			<u>DEVELOPMENT LONG-TERM IMPACTS</u>			<u>ABANDONMENTS RECLAIMED ACRES</u>			<u>NET LONG-TERM DISTURBANCE</u>		
	BLM	PVT	TOTAL	BLM	PVT	TOTAL	BLM	PVT	TOTAL	BLM	PVT	TOTAL
Existing Oil Fields	290	3,000	3,290	450	11,950	12,400	320	2,200	2,520	130	9,750	9,880
High/Moderate O&G Potential												
Most Likely Scenario	45	385	430	0	630	630	0	0	0	0	630	630
Less Than 5% Probability (Additional Impacted Acres)				0						0		
No Potential												
Most Likely Scenario	0	0	0	0	0	0	0	0	0	0	0	0
Less Than 5% Probability	0											
<b>TOTAL AFFECTED ACRES</b>	<b>335</b>	<b>3,385</b>	<b>3,720</b>	<b>450</b>	<b>12,580</b>	<b>13,030</b>	<b>320</b>	<b>2,200</b>	<b>2,520</b>	<b>130</b>	<b>10,380</b>	<b>10,510</b>

## **AIR QUALITY**

### **SAN JOAQUIN VALLEY AIR BASIN**

Compared to the Current Management Alternative (Alternative "A"), there would be four fewer exploratory wells and 15 fewer producing wells within the San Joaquin Valley Air Basin. This assumes that a new oil & gas field would not be discovered before existing leases outside the developed oil fields expire. For analysis purposes, Alternative A assumed that a new field would be discovered even though the probability of discovery is less than 5%.

Following the same procedures outlined in the analysis for Alternative A would indicate that this alternative would result in increased annual emissions of 59,480 lbs of ROGs, 36,985 lbs of nitrogen oxides, and 10,332 lbs of particulates.

Cumulative impacts are the same as described under Alternative A. When viewed in concert with other anticipated emission sources, it is apparent emissions from federal oil & gas leases in the San Joaquin Valley Air Basin would contribute a negligible amount with overall air quality deteriorating and continued failure to meet federal standards for air quality within the basin. Mitigation described under Alternative A would also be appropriate for this alternative.

### **NORTH CENTRAL COAST AIR BASIN**

Compared to the Current Management Alternative (Alternative "A"), there would be four fewer exploratory wells and 15 fewer producing wells within the North Central Coast Air Basin. This would result in a net reduction of eight producing wells on federal leases in the air basin.

Following the procedures used in the analysis for Alternative A would indicate that by year 2005, the net annual emissions from federal leases would result in a decline of 65,110 lbs of nitrogen oxides, 29,855 lbs of ROGs, and 31,140 lbs of particulates. In actuality, greater declines would probably be realized since these calculations assume that new wells would produce the same emissions as existing wells that were being abandoned.

It is unlikely there would be any impact to air quality in Pinnacles National Monument since adjacent lands are not currently under oil & gas lease, and under this alternative no new leases would be issued.

Cumulative impacts would be the same as described under Alternative A. Oil and gas operations on both federal and private lands would result in reduced emissions of ROGs, nitrogen oxides, and particulates. Mitigation measures would also be the same except that



measures to protect air quality at Pinnacles National Monument would probably not be necessary under this alternative.

## **VEGETATION**

Impacts would be similar to those described under the Current Management Alternative (Alternative "A") except that total disturbed areas would be limited to 785 acres with all disturbed areas within the developed oil fields.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANT SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since curtailing the leasing is not expected to affect these producing leases. There would be a high probability that adverse impacts could occur to T&E listed species and Category 2 species if there is any new surface disturbance in the Jacalitos and North Kettleman Dome oil fields prior to comprehensive botanical inventories.

It is very unlikely there would be any impact to T&E plant species in areas outside the producing fields. The only potential impact would be from operations that could occur on existing leases before the leases expire. Most existing leases would expire during the next five to six years and under this alternative would not be renewed.

Cumulative impacts would be the same as described under Alternative A, with any loss of T&E populations potentially threatening the long-term survival of the affected species. Mitigation measures for actions within the developed oil fields described under Alternative A would also still be appropriate under this alternative.

## **WILDLIFE**

There would be no impact to wildlife under this alternative since most activity would occur in the developed oil fields where wildlife values have already been compromised by oil & gas development activities.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMAL SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since curtailing the leasing is not expected

to affect these producing leases. Continued development of the Coalinga oil fields could jeopardize remnant populations of San Joaquin kit fox and blunt-nosed leopard lizard.

It is very unlikely there would be any impact to T&E animal species in areas outside the producing fields. The only potential impact would be from operations that could occur on existing leases before the leases expire. Most existing leases would expire during the next five to six years and under this alternative would not be renewed.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"), with most San Joaquin Valley habitats on private land potentially lost by 1996 given current rates of development. Mitigation measures for actions within the developed oil fields described under the Current Management Alternative (Alternative "A") would also still be appropriate under this alternative.

## **WATER QUALITY/EROSION**

### **SURFACE WATER/EROSION**

There would be a slight, but probably indiscernible difference in impacts when compared to the Current Management Alternative (Alternative "A"). There could be a slight difference in surface erosion since about 60 to 65 fewer acres would be disturbed by construction activities under this alternative. Some increased erosion could occur but would be minimal since mitigation would require procedures consistent with regional Best Management Practices (BMPs).

### **SURFACE WATER/OIL SPILLS**

Impacts would be the same as in the Current Management Alternative (Alternative "A") since the greatest danger of oil spills would be in the existing developed oil fields. There would be a potential for contamination of the Silver Creek drainage if a major spill occurred in the Vallecitos field.

## **GROUNDWATER**

There would be no impact to groundwater quality. See the discussion under the Current Management Alternative (Alternative "A").

As per the discussion under the Current Management Alternative, there are no anticipated cumulative impacts. Mitigation measures as described under the Current Management Alternative would all be appropriate since all apply to operations in the existing oil fields.



## **VISUAL RESOURCES**

Under this alternative there would be no new O&G leases on BLM managed federal lands in the Hollister Resource Area.

Impacts in the developed oil fields would be the same as in the Current Management Alternative (Alternative "A") since the oil fields are already under lease and would not be affected by elimination of new leasing. There would be no degradation of existing scenic values and improvement in some oil fields with abandonment procedures resulting in the removal of unsightly decrepid oil facilities.

Most potential impacts anticipated outside the developed oil fields probably would not occur since only portions of these lands are currently under lease and these leases should expire within the next five to six years. For the remainder of the life of the plan there would be no impacts to these areas.

I-5 Corridor - Some impacts could still occur in the I-5 corridor, however it is not very likely since few federal lands are currently under lease and these leases would expire within the next five to six years.

Pinnacles Area - There would be no impact to the Pinnacles National Monument viewshed since these areas are currently not under lease and new leases would not be issued under this alternative.

Williams Hill - Some impacts could still occur on Williams Hill since most of this area is currently under lease. These leases would expire in the next five to six years.

Cumulative impacts would be similar to the Current Management Alternative (Alternative "A"). Abandonments on private leases as well as federal leases in the Kettleman North Dome and Jacalitos fields could result in improvement of scenic quality in these areas. No cumulative impacts are identified for the I-5 corridor, Pinnacles area, or Williams Hill since under this alternative it is unlikely any impacts would occur to the federal lands.

Mitigation measures identified for the developed oil fields under the Current Management Alternative (Alternative "A") would also be appropriate under this alternative.

## **OIL AND GAS RESOURCES**

Exploration and development activities within the producing fields would continue unabated since public lands in the fields are already leased for oil & gas exploration and development.

Opportunities for discovery of a new oil & gas field on federal lands would be severely compromised since new areas would not be available for lease. Areas currently under lease which do not have producing wells would also not be available for oil & gas exploration after the existing leases expired.

This would eliminate the potential for discovery of between 200,000 and 1,000,000 barrels of oil or gas (Milliken 1990c). This represents only 0.003% and 0.017% respectively of the known California reserves of 5.9 billion barrels. The failure to discover these reserves of 200,000 to 1,000,000 barrels on public lands would have no discernable impact on the ability of California or the United States to be self-sufficient in the production of oil or gas resources.

### **Cumulative Impacts**

Studies completed by the National Academy of Sciences in 1979 indicated that continued withdrawal of lands from oil & gas exploration is one of several factors affecting future U.S. oil & gas production. Other factors affecting production were price controls on domestic oil & gas, and permitting processes for off-shore activities. This scenario has been modified by the oil glut of the 1980s which as depressed prices due to over supply and decreased demand. The oil glut has been projected to last under current conditions until the end of the 1990s.

The study projected that accelerated leasing and streamlined permit processing of offshore lands, and halting the trend toward increased withdrawals of onshore lands available for leasing could increase domestic oil production significantly. These changes in existing policies and procedures were expected to increase projected domestic oil production in 2010 from 6 quadrillion Btus to 16 quadrillion Btus. Additional increases in domestic production could be achieved if the government guaranteed a return on oil investments, relaxed implementation of the Clean Air Act, eliminated EIS requirements, and opened more public lands to oil exploration. However, these additional measures would only increase projected production by 2010 to 18 quadrillion Btus. Even under this most optimistic and permissive regulatory scenario, domestic oil production could not be maintained at current levels, and the trend toward increased reliance on foreign imports could not be reversed (National Academy of Sciences 1979).



# **ALTERNATIVE "C" - NSO ON T&E PLANT POPULATIONS/PINNACLES WATERSHED**

## **REASONABLY FORESEEABLE DEVELOPMENT SCENARIO**

Under this alternative there would be a "conditional" NSO stipulation on about 3,840 acres with high oil & gas O&G potential, and a permanent NSO stipulation on about 4,120 acres with moderate or no oil & gas potential. Projections for anticipated O&G exploration and development activities under this alternative are the same as in the Current Management Alternative (Alternative "A"). The NSO restrictions within the high potential areas all have a provision for waiving the restriction once conditions sufficient to protect the T&E botanical species have been met. These restrictions could result in delays and surface occupancy prohibitions on portions of some leases, but these restrictions are not expected to be sufficient to affect the overall amount of O&G activity projected.

## **AIR QUALITY**

Air quality impacts would be the same as in the Current Management Alternative (Alternative "A"). There would be increased emissions of ROG, nitrogen oxides, and particulates in the San Joaquin Valley and North Central Coast air basins. The cumulative impact would result in degradation of air quality and failure to meet federal standards for air quality in the San Joaquin Valley Air Basin. The contribution from federal leases, however, would be negligible.

## **VEGETATION**

Impacts would be the same as described in the Current Management Alternative (Alternative "A") with vegetation severely disturbed on about 1,000 acres affected by federal leases.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANT SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since curtailing the leasing is not expected to affect these producing leases. There would be a high probability that adverse impacts could occur to T&E listed species and Candidate 2 species if there is any new surface disturbance in the Jacalitos and North Kettleman Dome oil fields prior to comprehensive botanical inventories.

While all known populations of the three T&E listed species would be protected under this alternative, the future of unknown populations on potential habitat that has not been adequately inventoried could be jeopardized if development was permitted prior to the completion of adequate inventories.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"), with any loss of T&E populations potentially threatening the long-term survival of the affected species. Mitigation measures described under Alternative A would also be appropriate under this alternative. It would not, however, be necessary to defer leasing in areas with occupied T&E plant habitat.

## **WILDLIFE**

Impacts to wildlife would be the same as in the Current Management Alternative (Alternative "A"). There would be no impact within the developed oil fields. There could a temporary impact to as many as 120 acres from exploration activities, and a permanent loss of up to 55 acres of wildlife habitat. Cumulative impacts and mitigation measures would be the same as described under the Current Management Alternative (Alternative "A").

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMAL SPECIES**

Impacts to threatened or endangered animal species would be the same as in the Current Management Alternative (Alternative "A"). Loss of habitat and direct mortality resulting from continued development of the Coalinga oil fields could impact remnant populations of San Joaquin kit fox and blunt-nosed leopard lizards. Some incidental mortality could occur to these species and to the giant kangaroo rat from exploration and development activities outside the developed oil fields, but these impacts are not expected to affect the vitality of these populations.

## **WATER QUALITY/EROSION**

Impacts would be the same as in the Current Management Alternative (Alternative "A"). Some additional erosion would occur from the disturbance of up to 505 acres, but impacts would be minimal since mitigation would require procedures consistent with regional Best Management Practices (BMPs). There would be a potential for contamination of the Silver Creek drainage if a major spill occurred in the Vallecitos field. There would be no impact to groundwater quality.



As per the discussion under the Current Management Alternative (Alternative "A"), there are no anticipated cumulative impacts. Mitigation measures described under the Current Management Alternative would also be appropriate for this alternative.

## **VISUAL RESOURCES**

Under this alternative there would be No Surface Occupancy permitted in the foreground viewshed of the Pinnacles National Monument.

Impacts in the developed oil fields would be the same as in the Current Management Alternative (Alternative "A"). There would be no degradation of existing scenic values. There could be improvement of scenic quality in some oil fields if abandonment procedures result in the removal of unsightly decrepid oil facilities.

Impacts to the I-5 corridor would be the same as in the Current Management Alternative (Alternative "A") with a potential for transforming up to 160 acres from a natural appearing landscape to a semi-industrial setting.

Impacts to Williams Hill would be the same as in the Current Management Alternative (Alternative "A") with potential impacts from new road cuts.

There would be no impact to the Pinnacles National Monument viewshed since adjacent BLM lands are not currently under lease, and any new leases would have an NSO stipulation for portions of the lease within the park foreground viewshed. This would eliminate the potential for future impacts to scenic vistas from the park's trail system.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"). Abandonments on private leases as well as federal leases in the Kettleman North Dome and Jacalitos fields could result in improvement of scenic quality in these areas. Intense development pressures on private lands could result in federally owned lands providing the only natural vistas on the I-5 corridor between Sacramento and the Grapevine. Mitigation measures identified for the developed oil fields under the Current Management Alternative (Alternative "A") would also be appropriate under this alternative. No cumulative impacts were identified for Williams Hill or the Pinnacles National Monument.

Mitigation measures described under the Current Management Alternative (Alternative "A") would also be appropriate under this alternative.

## **OIL AND GAS RESOURCES**

Impacts to oil & gas resources would be the similar to the Current Management Alternative (Alternative "A") since application of the NSO stipulations is not expected to affect the level of O&G exploration or development activity.

There could be some delays and additional costs associated with oil & gas exploration and development activities. Delays could occur pending completion of suitable botanical inventories. Following the completion of inventories it is anticipated that exploration and development activities could proceed, and that only minor deviations in drilling plans would be required to avoid impacts to T&E plant populations.

Exploration and development of oil & gas resources in the Pinnacles viewshed would be more expensive since directional drilling from off-site locations could be necessary. The use of directional drilling could double exploration costs. The oil & gas potential of this area, however is rated as moderate, and the potential for discovery of new oil & gas resources in this area is remote.

## **ALTERNATIVE "D" - NSO ON T&E PLANT HABITAT/PINNACLES VIEWSHED**

### **REASONABLY FORESEEABLE DEVELOPMENT SCENARIO**

Under this alternative there would be a "conditional" NSO stipulation on about 83,160 acres of public land and 85,000 acres of private land with federal mineral ownership. These areas generally have a high or moderate oil & gas potential. There would also be a permanent NSO stipulation on about 4,120 acres with moderate or no oil & gas potential. Projections for anticipated O&G exploration and development activities under this alternative are the same as in the Current Management Alternative (Alternative "A"). The NSO restrictions within the developed fields and high potential areas all have a provision for waiving the restriction once conditions sufficient to protect the T&E botanical species have been met. These restrictions could result in delays and surface occupancy prohibitions on portions of some leases, but these restrictions are not expected to be sufficient to affect the overall amount of O&G activity projected.

## **AIR QUALITY**

Air quality impacts would be the same as in the Current Management Alternative (Alternative "A"). There would be increased emissions of ROG's, nitrogen oxides, and particulates in the



San Joaquin Valley and North Central Coast air basins. The cumulative impact would result in degradation of air quality and failure to meet federal standards for air quality in the San Joaquin Valley Air Basin of which a negligible amount would come from the federal leases.

## **VEGETATION**

Impacts would be the same as described in the Current Management Alternative (Alternative "A") with vegetation severely disturbed on about 1,000 acres affected by federal leases.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANT SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since curtailing the leasing is not expected to affect these producing leases. There would be a high probability that adverse impacts could occur to T&E listed species and Category 2 species if there is any new surface disturbance in the Jacalitos and North Kettleman Dome oil fields prior to comprehensive botanical inventories.

It is unlikely there would be any impact to T&E plant species in areas outside the producing fields. The only potential impact would be from operations that could occur on existing leases before the leases expire. Any new leases within occupied or potential T&E plant habitat would be issued with an NSO stipulation unless adequate inventories had been conducted to assure T&E populations did not exist. No disturbance of these areas would be authorized until inventories and subsequent studies indicated there would be no damage to T&E plant populations.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"), with any loss of T&E populations potentially threatening the long-term survival of the affected species. Mitigation measures for actions described under the Current Management Alternative (Alternative "A") would also still be appropriate under this alternative. It would not, however be necessary to defer leasing in areas with potential or occupied T&E plant habitat.

## **WILDLIFE**

Impacts to wildlife would be the same as in the Current Management Alternative (Alternative "A"). There would be no impact within the developed oil fields. There could be a temporary impact as many as 120 acres from exploration activities, and a permanent loss of

up to 55 acres of wildlife habitat. Cumulative impacts and mitigation measures would be the same as described under the Current Management Alternative (Alternative "A").

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMAL SPECIES**

Impacts to threatened, endangered and other special status animal species would be the same as the Current Management Alternative (Alternative "A"). Loss of habitat and direct mortality resulting from continued development of the Coalinga/Avenal oil fields could jeopardize remnant populations of San Joaquin kit fox and blunt-nosed leopard lizards. Some incidental mortality could occur to these species and to the giant kangaroo rat from exploration and development activities outside the developed oil fields, but these impacts are not expected to affect the vitality of these populations.

## **WATER QUALITY/EROSION**

Impacts would be the same as in the Current Management Alternative (Alternative "A"). Some additional erosion would occur from the disturbance of up to 505 acres, but impacts would be minimal since mitigation would require procedures consistent with regional Best Management Practices (BMPs). There would be a potential for contamination of the Silver Creek drainage if a major spill occurred in the Vallecitos field. There would be no impact to groundwater quality.

As per the discussion under the Current Management Alternative (Alternative "A"), there are no anticipated cumulative impacts. Mitigation measures described under the Current Management Alternative would also be appropriate for this alternative.

## **VISUAL RESOURCES**

Impacts would be the same as described for the NSO On T&E Plant Habitat/Pinnacles Viewshed Alternative (Alternative "C").

There would be no impact to the Pinnacles viewshed since no surface occupancy would be permitted in the foreground viewshed of the monument.

Impacts in the developed oil fields would be the same as in the Current Management Alternative (Alternative "A"). There would be no degradation of existing scenic values in the oil fields. However abandonment procedures in some fields could improve scenic quality by removing unsightly decrepid oil facilities.



Impacts to the I-5 corridor would be the same as in the Current Management Alternative (Alternative "A") with a potential for transforming up to 160 acres from a natural appearing landscape to a semi-industrial setting.

Impacts to Williams Hill would be the same as in the Current Management Alternative with potential impacts from new road cuts.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"). Abandonments on private leases as well as federal leases in the Kettleman North Dome and Jacalitos fields could result in improvement of scenic quality in these areas. Intense development pressures on private lands could result in federally owned lands providing the only natural vistas on the I-5 corridor between Sacramento and the Grapevine. Mitigation measures identified for the developed oil fields under the Current Management Alternative (Alternative "A") would also be appropriate under this alternative. No cumulative impacts were identified for Williams Hill or the Pinnacles National Monument.

Mitigation measures described under the Current Management Alternative (Alternative "A") would also be appropriate under this alternative.

## **OIL AND GAS RESOURCES**

Impacts to oil & gas resources would be similar to the Current Management Alternative (Alternative "A") since application of the NSO stipulations is not expected to affect the level of O&G exploration or development activity.

There could be some delays and additional costs associated with oil & gas exploration and development activities. Delays could occur pending completion of suitable botanical inventories. Following the completion of inventories it is anticipated that exploration and development activities could proceed, and that only minor deviations in drilling plans would be required to avoid impacts to T&E plant populations.

Exploration and development of oil & gas resources in the Pinnacles viewshed would be more expensive since directional drilling from off-site locations could be necessary. The use of directional drilling could double exploration costs. The oil & gas potential of this area, however is rated as moderate, and the potential for discovery of new oil & gas resources in this area is remote.

# **ALTERNATIVE "E" - NO LEASING IN T&E ANIMAL HABITAT**

## **REASONABLY FORESEEABLE DEVELOPMENT SCENARIO**

Under this alternative there would be no new leasing within the habitat of threatened or endangered animal species except within the developed oil fields. About 55% of the moderate/high potential lands would not be available for leasing and subsequent exploration under this alternative. Some exploration activity could still occur in these areas during the next five years since about 20% of the habitat area is already under lease. O&G exploration and development activities probably would not be significantly different than projected under the Current Management Alternative (Alternative "A"). Because less land would be available for O&G exploration, this alternative could result in fewer exploration wells than projected under the Current Management Alternative. This difference, however, is probably insignificant since, under the Current Management Alternative, the total number of exploration wells projected in the high/moderate potential areas was only four to six wells.

## **AIR QUALITY**

Air quality impacts would be the same as in the Current Management Alternative (Alternative "A"). There would be increased emissions of ROGs, nitrogen oxides, and particulates in the San Joaquin Valley and North Central Coast air basins. The cumulative impact would result in degradation of air quality and failure to meet federal standards for air quality in the San Joaquin Valley Air Basin with a negligible amount related to federal leases.

## **VEGETATION**

Impacts would be the same as described in the Current Management Alternative (Alternative "A") with vegetation severely disturbed on about 1,000 acres affected by federal leases.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANT SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since curtailing the leasing is not expected to affect these producing leases. There would be a high probability that adverse impacts could occur to three T&E listed species and one Category 2 species if there is any new surface disturbance in the Jacalitos and North Kettleman Dome oil fields prior to



comprehensive botanical inventories. Impacts could also occur to these species in the Vallecitos oil field.

It is very unlikely there would be any impact to T&E plant species in areas outside the producing fields. The only potential impact would be from operations that could occur on existing leases before the leases expire. No new leases would be issued on about 168,160 acres of potential T&E plant habitat which overlaps with the T&E animal habitat. Any new leases within the remaining occupied or potential T&E plant habitat would be issued with an NSO stipulation unless adequate inventories had been conducted to assure T&E populations did not exist. No disturbance of these areas would be authorized until inventories and subsequent studies indicated there would be no damage to T&E plant populations.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"), with any loss of T&E populations potentially threatening the long-term survival of the affected species. Most mitigation measures for actions described under the Current Management Alternative would also still be appropriate under this alternative. It would not, however be necessary to defer leasing in areas with potential or occupied T&E plant habitat since the NSO stipulation would protect these species.

## **WILDLIFE**

Impacts would be similar to those described for the Current Management Alternative (Alternative "A"). There would be no impacts to wildlife within the developed oil fields. T&E animal habitat areas that would not be leased under this alternative are all annual grasslands. There would be less potential for impact to upland gamebirds since much of their habitat would remain unleased under this alternative.

There would be a potential for temporary impact to as many as 120 acres from exploration activities, and a permanent loss of up to 55 acres of wildlife habitat. Most of these impacts would occur in chaparral habitats since exploration activities would be prohibited in most annual grasslands.

Cumulative impacts and mitigation measures would be the same as described under the Current Management Alternative.

## **THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMAL SPECIES**

Potential impacts within the existing oil fields would be the same as described under the Current Management Alternative (Alternative "A") since this alternative would not affect leasing in the developed oil fields. Continued development of the Coalinga oil fields could jeopardize remnant populations of San Joaquin kit fox and blunt-nosed leopard lizard.

It is very unlikely there would be any impact to T&E animal species in areas outside the producing fields. The only potential impact would be from operations that could occur on existing leases before the leases expire. Most existing leases in T&E habitat would expire during the next five to six years and under this alternative would not be renewed.

Cumulative impacts would be the same as described under the Current Management Alternative (Alternative "A"), with most San Joaquin Valley habitats on private land potentially lost by 1996 given current rates of development. Mitigation measures for actions within the developed oil fields described under the Current Management Alternative would also still be appropriate under this alternative.

## **WATER QUALITY/EROSION**

Impacts would be the same as in the Current Management Alternative (Alternative "A"). Some additional erosion would occur from the disturbance of up to 505 acres, but impacts would be minimal since mitigation would require procedures consistent with regional Best Management Practices (BMPs). There would be a potential for contamination of the Silver Creek drainage if a major spill occurred in the Vallecitos field. There would be no impact to groundwater quality.

As per the discussion under the Current Management Alternative (Alternative "A"), there are no anticipated cumulative impacts. Mitigation measures described under the Current Management Alternative would also be appropriate for this alternative.

## **VISUAL RESOURCES**

Impacts in the developed oil fields would be the same as in the Current Management Alternative (Alternative "A"). There would be no degradation of existing scenic values and improvement in the oil fields, however abandonment procedures in some fields could result in the removal of unsightly decrepid oil facilities.

Leasing would not be permitted within the viewshed of the I-5 corridor since all federal lands in the I-5 foreground or middleground area are habitat for T&E animals. Some impacts could



still occur in the I-5 corridor, however it is not very likely since few federal lands are currently under lease and most of these leases would expire within the next five to six years.

Impacts to Williams Hill would be the same as in the Current Management Alternative with potential impacts from new road cuts.

Cumulative impacts within the oil fields would be the same as described under the Current Management Alternative. Abandonments on private leases as well as federal leases in the Kettleman North Dome and Jacalitos fields could result in improvement of scenic quality in these areas.

Since no development would occur on federal lands in the I-5 viewshed, cumulative impacts to the viewshed are not addressed in this alternative. No cumulative impacts were identified for Williams Hill or the Pinnacles National Monument.

Mitigation measures described under the Current Management Alternative would also be appropriate under this alternative except that measures specific to the I-5 viewshed would not be necessary.

## **OIL AND GAS RESOURCES**

Opportunities for the discovery of a new oil & gas field on federal lands would be compromised since about 55% of the high and moderate O&G potential areas that are outside existing oil fields would not be available for oil & gas leasing. There is however a less than 5% chance that a new oil or gas field would be discovered in the high potential areas if all lands remained available for leasing, and even remoter change that a discovery could occur on lands with moderate potential.

This would eliminate the potential for discovery of between 200,000 and 1,000,000 barrels of oil or gas (Milliken 1990c). This compares with known California reserves of 5.9 billion barrels. The failure to discover these reserves of 200,000 to 1,000,000 barrels of oil on public lands would have no discernable impact on the ability of California or the United States to be self-sufficient in the production of oil or gas resources.

### **Cumulative Impacts**

While the failure to discover this new oil & gas field in the Hollister Resource Area would have virtually no impact on the U.S. production of oil & gas, it is but one of numerous actions that cumulatively could affect the availability of oil & gas resources in the United States. Eliminating existing regulatory barriers impeding oil & gas production however, would not be able to reverse the trend toward increased reliance on foreign imports (National Academy of Sciences 1979). Refer to the section of this chapter on Oil and Gas Resources

under the No Leasing Alternative (Alternative "B") for additional discussion of cumulative impacts.

## **SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY**

The primary resource use proposed in this amendment is the exploration and development of oil & gas resources. This exploration and development would directly impact areas that were actually occupied by oil production facilities. The maximum acreage affected would be 505 acres. Long-term productivity could also be affected indirectly by widespread damage to natural vegetation and increased incidence of respiratory diseases resulting from prolonged exposure to air pollution.

## **IRREVERSIBLE / IRRETRIEVABLE COMMITMENT OF RESOURCES**

Oil & gas resources are a nonrenewable resource. A decision to extract oil & gas from federal lands is an irretrievable commitment of our limited domestic supplies of energy resources. The potential loss of T&E plant and animal populations could be the catalyst for an irreversible demise of these species resulting in the irretrievable loss of natural diversity and irretrievable loss of biological and genetic components.



# **CHAPTER FIVE**

## **COORDINATION AND CONSULTATION**

### **INTRODUCTION**

This Environmental Impact State and land use plan amendment was prepared by an interdisciplinary team of specialists from the Bureau of Land Management's Hollister Resource Area, Bakersfield District Office, and California State Office. Reviews for accuracy and consistency were provided by both district office and the state office staff. Table #11 is a list of preparers.

Consultation, coordination, and public involvement have occurred throughout the process through public workshops, informal meetings, individual contacts, news releases, and *Federal Register* notices.

Initial steps in the process began in 1990 with the development of a preparation plan. Other early efforts included research, inventory, preliminary analysis, and interagency coordination.

### **PUBLIC PARTICIPATION**

A public participation plan was prepared to ensure that the public would have numerous opportunities to be actively involved in the planning and environmental process. Both formal and informal input have been encouraged and used throughout the planning process.

A Notice of Intent (NOI) to Prepare the Plan Amendment and an Environmental Impact Statement was published in the Federal Register on January 24, 1990. Copies of the NOI were mailed on January 26, 1990 to 180 interested and/or affected parties using the Resource Area's updated mailing list. Ninety of these individuals did not respond to the mailing and were removed from the mailing list.

The Notice of Intent included times and dates for three scheduled public workshops and a listing of proposed issues to be addressed in the EIS. Publication of the Notice of Intent in the *Federal Register* initiated a formal 30 day public comment period.

Tentative issues, planning criteria, and alternatives were published in the NOI to serve as a starting point for public and agency dialogue. The final issues and alternatives addressed in the EIS were developed in response to public and agency comment. BLM staff conducted meetings with all affected or interested federal, state, and local agencies. Open houses (workshops) were held in Hollister, King City, and Coalinga.

The Notice of Availability (NOA) of Planning Criteria was published in the *Federal Register* on June 6, 1991. Copies of the NOA were mailed to 90 individuals or organizations. Publication of the NOA in the *Federal Register* initiated another formal 30 day public comment period.

Copies of the Draft RMP Amendment and EIS are being sent to 90 individuals and organizations who have responded to previous mailings, and to agencies, governments, and corporations potentially affected by the plan. Public meetings will be held in Hollister and Coalinga to solicit comments on the Draft RMP Amendment and EIS.

## **CONSISTENCY**

Coordination with other agencies and consistency with other plans has been accomplished through frequent communication with agency representatives and judicious review of plans.

Regional water quality plans, air pollution control district plans, and county land use plans have been consulted to assure that all BLM proposed actions are consistent with local and regional plans.

State water quality control plans, Division of Oil & Gas procedures, and Department of Fish & Game habitat plans have also been consulted to assure consistency. Copies of the NOI were distributed to the California State Clearinghouse to facilitate distribution and comment from interested state agencies.

Current management plans for the Los Padres National Forest and the Pinnacles National Monument were reviewed for consistency. U.S. Fish & Wildlife Service recovery plans for T&E species were also reviewed.

## **CONSULTATION AND COORDINATION**

Members of the interdisciplinary team have consulted formally and informally with numerous agencies, groups, and individuals during the development of the land use plan amendment and EIS. Following is a list of organizations that have participated in this planning process.

### **INDUSTRY REPRESENTATIVES**

ARCO  
Texaco



Shell  
Chevron  
California Energy Co.  
Western Mining Council  
Western States Petroleum Assn  
Faber & Associates  
Union Oil Co.  
Lynn Title Services  
Molycorp Inc.  
Kern County Prospectors  
Phillips  
Victory Oil Co.  
Tule Gem & Mineral Society

#### **GOVERNMENT AGENCIES/ELECTED OFFICIALS**

CA Dept of Fish & Game  
CA Energy Commission  
CA State Lands Commission  
CA Div of Oil & Gas  
State Historic Preservation Office  
US Bureau of Reclamation  
US Fish & Wildlife Service  
US Soil Conservation Service (Salinas)  
US Soil Conservation Service (Fresno)  
US Soil Conservation Service (Gilroy)  
Pinnacles National Monument  
Monterey County Planning Dept  
Monterey Bay Unified Air Pollution Control District  
Monterey Bay Regional Park District  
Association of Monterey Bay Governments  
San Benito County Planning Dept  
Fresno County Planning Dept  
Merced County Planning Dept  
Westside Resource Conservation District  
Congressman Leon Panetta  
Fresno County Air Pollution Control Board

#### **OTHER ORGANIZATIONS**

CA Native Plant Society  
Dept of Biology, CU/Fresno

Sierra Club (SF Branch)  
Hastings Institute, (UC/Berkeley)  
PG & E  
District Multiple Use Advisory Council (John Blake)



**TABLE #11**  
**LIST OF PREPARERS**

<b>NAME</b>	<b>RESPONSIBILITY</b>	<b>EDUCATION &amp; EXPERIENCE</b>
Steve Addington	Team Leader, Air Quality	BA, Anthropology BLM: 11 years
John Hervey	Visual Resources	MA, Fisheries Management BLM: 12 years
Dennis Johnson	Wildlife, T&E Animals	BS, Forestry (Wildlife) BLM: 30 years
Bruce Delgado	Vegetation, T&E Plants	BS, Wildlife Management BLM: 3 years
Mark Milliken	RFD Scenarios	MS, Geology USDI: 10 years
Ken Holden	Geophysical Exploration	MA, Geology USDI: 26 years
Larry Saslaw	T&E Animals (Review)	BS, Wildlife Management BLM: 14 years
Jack Mills	SO Review	MA, Planning BLM: 13 years
Phil Lopez	Soil, Water, and Air Quality Review	BA, Soils SCS: 5 years FS: 3 years BLM: 2 years
Bob Beehler	Management Direction	BA, Physical Geography BLM: 13 years
Pat Bell	DO Review	MA, Geology industry: 7 years BLM: 1 year
Robert Barney	SO Review	MS, Resource Geography BLM: 27 years
Ed Lynch	Planning & Environmental Coordination (P&EC)	MA, Botany BLM, 20 years

## **APPENDIX A PLANNING CRITERIA**

The planning criteria are the laws, regulations, policy and management guidance that govern the consideration of each issue. The planning criteria are developed during the scoping process and are made available for public review. A Notice of Availability (NOA) of the planning criteria was published in the *Federal Register* on June 6, 1991. Listed below are the planning criteria for each issue addressed in the Environmental Impact Statement.

### **ISSUE #1 - AIR QUALITY**

Clear Air Act as amended - Federal law providing national policy on air pollution prevention and control.

Executive Order 11752 (Air & Water Quality) - This Presidential order mandates that federal agencies shall provide national leadership to protect and enhance the quality of air, water, and land resources through compliance with applicable federal, state, and local pollution standards.

BLM Manual 1621.1 (Supplemental Program Guidance for Environmental Resources: Air Resources) - Provides BLM guidance and quality standards for air resources during the development of land use plans (Resource Management Plans).

Federal Land Policy & Management Act of 1976 - This Act provides for management of the public lands under principles of multiple use and sustained yield. The Act specifically calls for the periodic and systematic inventory of public land resources; the development, maintenance, and revision of land use plans using an interdisciplinary approach; and compliance with state and federal air and water pollution standards.

### **ISSUE #2 - THREATENED, ENDANGERED AND OTHER SPECIAL STATUS PLANTS**

Endangered Species Act of 1973 (as amended) - Federal law requiring the BLM to insure that its actions are not likely to jeopardize the continued existence of listed threatened or endangered species. Section 7 of the Act also requires BLM to consult with the U.S. Fish and Wildlife Service whenever actions are proposed that may affect listed threatened or endangered species. The Act also orders BLM to carry out programs for the conservation of listed endangered or threatened species.

BLM Manual 6840 (Special Species Management) - Provides BLM policy and guidance for the conservation of special status species of plants and animals, and the habitats on which



they depend. Special status species include officially listed species (threatened or endangered species), species that are proposed or candidate species for listing, state listed species, and species listed as "sensitive" by the BLM State Director.

California BLM Manual Supplement 6840.2 (State Listed Plants and Animals) - Provides BLM policy and guidance for the conservation of plants and animals, and the habitats on which they depend, which are officially listed as rare or endangered pursuant to California State Law.

BLM Standard Lease Terms & Conditions (BLM Form 3100-11) - Conditions and terms included on the standard lease form which are applied to all BLM oil & gas leases. Included in Section 6 are provisions requiring the operator to minimize impacts to biological resources, take reasonable measures required by the BLM to protect resources, conduct minor inventories or short term special studies, contact the BLM if threatened or endangered species are observed, and cease operations that would result in the destruction of threatened or endangered species.

43 Code of Federal Regulations 3101.1-2 - Federal regulations providing lessee with right to explore and develop leased lands subject to lease stipulations, restrictions from nondiscretionary statutes, and reasonable measures required by the authorized officer. Provides that reasonable measures, at a minimum, are consistent with lease rights if they do not require relocation of operations more than 200 meters, require siting of facilities off the lease, or prohibit surface disturbing operations more than 60 days in any lease year.

Area Manager Decision/Policy: Prior to authorization of any surface disturbing activity, a review of existing ecological data will be conducted to determine if any species of concern may exist on the proposed site. If this review indicates species of concern may occur on the site, then a site-specific field examination will be conducted during the appropriate season to determine if the species occupies the site. If species occur, then all surface disturbing activity will be moved up to 200 meters to avoid adverse impacts to the species. If movement of the site this distance is insufficient to avoid impacts, then additional mitigation measures will be developed in conjunction with Section 7 consultation with the U. S. Fish & Wildlife Service.

### **ISSUE #3 - THREATENED, ENDANGERED AND OTHER SPECIAL STATUS ANIMALS**

Endangered Species Act of 1973 (as amended) - Federal law requiring the BLM to insure that its actions are not likely to jeopardize the continued existence of listed threatened or endangered species. Section 7 of the Act also requires BLM to consult with the U.S. Fish and Wildlife Service whenever actions are proposed that may affect listed threatened or endangered species. The Act also orders BLM to carry out programs for the conservation of listed endangered or threatened species.

BLM Manual 6840 (Special Species Management) - Provides BLM policy and guidance for the conservation of special status species of plants and animals, and the habitats on which they depend. Special status species include officially listed species (threatened or endangered species), species that are proposed or candidate species for listing, state listed species, and species listed as "sensitive" by the BLM State Director.

California BLM Manual Supplement 6840.2 (State Listed Plants and Animals) - Provides BLM policy and guidance for the conservation of plants and animals, and the habitats on which they depend, which are officially listed as rare or endangered pursuant to California State Law.

BLM Standard Lease Terms & Conditions (BLM Form 3100-11) - Conditions and terms included on the standard lease form which are applied to all BLM oil & gas leases. Included in Section 6 are provisions requiring the operator to minimize impacts to biological resources, take reasonable measures required by the BLM to protect resources, conduct minor inventories or short term special studies, contact the BLM if threatened or endangered species are observed, and cease operations that would result in the destruction of threatened or endangered species.

43 Code of Federal Regulations 3101.1-2 - Federal regulations providing lessee with right to explore and develop leased lands subject to lease stipulations, restrictions from nondiscretionary statutes, and reasonable measures required by the authorized officer. Provides that reasonable measures, at a minimum are consistent with lease rights if they do not require relocation of operations more than 200 meters, require siting of facilities off the lease, or prohibit surface disturbing operations more than 60 days in any lease year.

50 Code of Federal Regulations; Part 402 - Federal regulations implementing Section 7 of the Endangered Species Act. These provide specific procedural guidance for federal agencies to assure compliance with Section 7 of the Act.

Area Manager Decision/Policy: Measures included in the Panoche/Coalinga ACEC Plan to mitigate oil & gas exploration and development activities will be implemented in all areas within the resource area where potential or occupied habitat for these species occurs.

#### **ISSUE #4 - VISUAL QUALITY**

BLM Manual 8400 (Visual Resource Management) - Provides BLM policy and guidance for management of the public lands in a manner which will protect the quality of the scenic (visual) values of these lands.

Federal Land Policy and Management Act of 1976 -This Act provides for management of the public lands under principles of multiple use and sustained yield. The Act specifically



requires that public lands be managed in a manner that will protect the quality of scenic values.

National Environmental Policy Act of 1969 - This Act provides national policy for environmental protection. The Act states that it is the national environmental policy to use all practicable means to assure all Americans aesthetically pleasing surroundings.

BLM Standard Lease Terms & Conditions (BLM Form 3100-11) - Conditions and terms included on the standard lease form which are applied to all BLM oil & gas leases. Included in Section 6 are provisions requiring the operator to take reasonable measures to minimize impacts to visual resources.

43 Code of Federal Regulations 3101.1-2 - Federal regulations providing lessee with right to explore and develop leased lands subject to lease stipulations, restrictions from nondiscretionary statutes, and reasonable measures required by the authorized officer. Provides that reasonable measures include, but are not limited to, modification to design or siting of facilities, and relocation of proposed operations by up to 200 meters.

## **ISSUE #5 - GROUNDWATER OR SURFACE WATER QUALITY**

43 Code of Federal Register 3160 (Onshore Oil and Gas Order No. 1) - Federal regulations establishing procedures for approvals of wells on federal oil and gas leases. Requires operator to assure that underground sources of fresh water will not be endangered by any fluid injection operation.

BLM Manual 3160-1 (Application for Permit to Drill & Subsequent Operations) - BLM regulations providing guidelines and procedures for processing Applications for Permit to Drill. Requires that downhole drilling plan is adequate to protect all fresh water sources.

Surface Operating Standards for Oil & Gas Exploration and Development - Interagency guidelines developed to provide design and construction techniques and other practices that would minimize surface disturbance, effects on other resources, and maintain reclamation potential of lease sites.

Regional Water Quality Control Board Basin Plans -Regional plans that establish water quality control objectives for specified water basins. The two plans that provide guidance for the Hollister Resource Area are the Central Valley Basin and Central Coast Basin Water Quality Plans.

## **ISSUE #6 - MINERAL EXPLORATION AND DEVELOPMENT**

The Mineral Leasing Act of 1920 - Provides that oil & gas deposits on public lands are available for leasing. This act authorizes the Secretary of the Interior to issue leases to

individuals and organizations providing for the exclusive right to explore for and develop mineral resources within the lands covered by the lease.

The National Materials and Mineral Policy Research and Development Act of 1980 - States the current policy of the Federal government regarding oil and gas exploration and development. This Act states that private enterprise is to be encouraged to develop domestic mineral resources and that Federal agencies are to facilitate availability and development of domestic resources. It also emphasizes prompt reclamation of disturbed lands.

The Federal Land Policy and Management Act of 1976 - FLPMA authorizes the Secretary of the Interior to withdraw public lands from entry under the mineral leasing laws. However, on withdrawals of 5,000 acres or more in size, the Secretary must notify both Houses of Congress of the withdrawal. Congress then has 90 days to nullify that action.

43 Code of Federal Regulations 3100 - Federal regulations establishing procedures for issuance of oil & gas leases on public lands.

43 Code of Federal Regulations 3160 - Federal regulations providing procedures for approval of oil & gas exploration and development on public lands.



## **APPENDIX B**

### **OIL AND GAS OPERATIONS ON PUBLIC LANDS**

This appendix presents a more detailed description of typical oil and gas operations on public lands.

#### **Geophysical Exploration**

Oil and gas can be discovered by either direct or indirect exploration methods. Direct exploration methods include the mapping of rock outcrops and oil seeps by geologists, often on foot; or more disruptive drilling and subsequent drill core analysis. Indirect methods include seismic and gravity surveys which can be used to delineate features which may contain oil and gas.. The general term for the indirect methods is geophysical exploration, of the two methods a gravity survey will usually cause less disturbance.

Gravitational prospecting detects micro-variations in gravitational attractions caused by the differences in the density of various types of rock through the use of an instrument known as a gravimeter. Data derived from gravity surveys is used to generate anomaly maps, from which faults and general structural trends can be interpreted. Survey measurements are taken at many points along a linear path with a gravimeter. The gravimeter is transported either by backpack, helicopter, or off-road vehicle (ORV). Because gravity surveys can be conducted from the air or by a backpacker, surface disturbance is not necessary. However, surface disturbance may occur if ORV use is permitted for the purpose of conducting the survey.

A seismic survey is the most popular method currently utilized for locating subsurface structures which may contain oil and gases. Seismic prospecting is based on the fact that energy in the form of shock waves generated from a point source [or array of point sources] are reflected and/or refracted [bent] to varying degrees and then travel at different speeds as they pass through different rock types. An analogy is the dropping of a stone in a quite pool of water, where energy is seen as outward circles of waves emitting from the point source where the stone was dropped.

A seismic wave travels down into the earth, as the wave encounters rock layers of different compositions, some of the waves change velocity and slow or speed-up, some of the energy is reflected back up to the ground where sensing devices [called geophones] receive and allow recording of the energy variation.

Geophones are connected by ground wire to the recording truck where incoming data is stored on magnetic tape. The magnetic tape can be played back and processes through computers to give a presentation of the rock layers beneath the seismic array. The presentation can be printed onto a paper copy which has time/depth on the vertical axis and

horizontal distance on the horizontal axis. The rock layers show up as dark and light bands of wave traces.

The time required for the original waves from the energy source to travel from the surface to a given rock layer [or reflector] and then to be received back at the surface, is known as two-way time. To find the one-way time down to the rock layer, and then convert this to depth down to the rock layer, you must multiply the wave velocity received from the geophone, by one-half the travel time recorded by the geophone. Time can then be converted to depth from surface down to the rock layer [or reflector] based on a table of average velocities through various types of rock layers.

The amount of disturbance is dependent on the type of energy source which is used. Energy sources can range from small explosive devices [either surface or shallow subsurface] to vibrations through the earth's crust created by Vibroseis trucks, sometimes called thumper trucks. These trucks vertically pound or vibrate [a more side to side motion] to create a shock wave. Usually an array of four large trucks are used. Each truck has a large [about four square feet] pad located under the truck between the front and rear wheels. The pad is lowered to make contact with the ground and then the truck is raised up off the ground so the energy is from a point source. Once information is sent down, reflected, received, and then recorded, the truck array is moved forward a short distance and the process is repeated. Usually about 50 square feet of surface area is required to operate the equipment at each recording site. Access is by public roads and existing private roads and trails where possible. Graders and 'dozers' may be required to provide access in remote areas, off-road cross-country travel may be needed in some cases.

The two explosive methods require that explosive charges be detonated on the surface or in a shallow [100 to 200 feet] drill hole. Access is as above. Several trips a day are made along a seismic line, this allows for extra information needed in recording and processing data.

The surface charge method utilizes, either a two and one-half or a five pound charge attached to a wooden lath about three feet above the ground surface. The charge results in the destruction of vegetation and the disturbance of wildlife. The damage to vegetation is often undetectable after several growing seasons. Because of limited shock wave penetration this method is used where the target rocks are near the surface.

A typical drilling seismic survey may utilize a ten to fifteen member crew operating five to seven trucks. The vehicles used for a drilling program may include heavy truck-mounted drill rigs, track-mounted drill rigs, water trucks, a computer recording truck, and several pick-up trucks for various crew members. In rugged topography, a portable drill may be carried in by helicopter.

Usually four to twelve holes are drilled per mile. The holes are small diameter and 100 to 200 feet deep. A fifty pound charge of explosives is placed in the hole, covered, and



detonated. Under normal conditions three to five miles of line can be 'shot' or completed in a day. Drilling water may be trucked in or obtained from private land owners.

## **Geophysical Operations**

Geophysical Operations may be conducted regardless of whether the land is leased or not. An operator is required to file a "Notice of Intent to Conduct Oil and Gas Exploration Operations" for all geophysical activities on public lands administered by the BLM. The Notice of Intent, should include maps showing the line location and access route, any anticipated surface damage, and a time frame for operations. The operator must be bonded.

Notices to conduct geophysical operations on BLM surface are received by the appropriate resource area. Administration and surface protection are accomplished through close cooperation of the operator and the BLM. Seasonal restrictions may be imposed to reduce fire hazards, conflicts with wildlife [including threatened and endangered species], watershed damage, recreational use, and other issues.

## **Notice of Staking**

Notices of staking can only be approved , subject to regulations, on leases lands.

The federal lessee or operating company selects a drill site based on subsurface geology, geophysics, topography, and economic considerations. Once the company makes the decision to drill, they must decide whether to submit a Notice of Staking (NOS) or apply directly for a permit to drill. The NOS is an outline of what the company intends to do, including a location map and sketched site plan. The NOS is used to review any conflicts with known critical resource values. The BLM utilizes information contained in the NOS and obtained from the onsite inspection to develop stipulations to be incorporated into the APD. As a result of the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (Reform Act of 1987), upon receipt of an NOS the operator/company name, well name/number, well location and a map showing the drill site must be posted in a public place in the Bureau approving office and the Bureau Resource Area Office or the local surface management agency office for a minimum of 30 days prior to approving the APD.

## **Application for Permit to Drill (APD)**

The operator may or may not choose to submit an NOS; in either case, an Application for Permit to Drill must be submitted. An APD consists of two main parts: the 13 point surface plan which describes any surface disturbance and is reviewed by resource specialist, and the eight point plan which details the drilling program and is reviewed by the petroleum engineer and geologist. For the APD option the onsite inspection is used to assess possible impacts and develop stipulations to minimize these impacts. If the NOS option is not utilized then

the 30 day posting period as required by the Reform Act of 1987, will commence upon receipt of the APD by the BLM.

The BLM must prepare any site specific environmental documentation required by NEPA and develop mitigation measures necessary to protect any adversely affected resources. The BLM approves all wells drilled on federal minerals regardless of surface ownership. For privately owned surfaces it is the responsibility of the operator to obtain a surface owner agreement.

## **Drilling Phase**

Once the APD is approved, the operator may begin construction activities. When a sit is chosen that necessitates the construction of an access road the length will vary, but usually the shortest feasible route is selected to reduce the haul distance and construction costs. Environmental factors or a landowner's wishes may dictate a longer route in some cases.

During the first phase the operator moves construction equipment over existing roads to the point where the access road begins. Depending upon the type of terrain, equipment may include dozers (track-mounted and rubber tired), scrapers, and graders. Existing roads and trails often require improvement in places and occasionally culverts and cattle guards are installed.

The second phase is the construction of the drilling pad or platform. In some cases no disturbance other than a mud (reserve) pit and cellar is required. If surface disturbance is necessary, soil material suitable for plant growth is removed and stockpiled in a designated area, to be used later for rehabilitation and reseeded. Drilling sites on ridgetops or hillsides are constructed by cutting and filling portions of the location after the topsoil has been removed. The majority of the excess cut material is stockpiled in an area that will allow it to be easily recovered for rehabilitation. It is important to confine extra cut material to a stockpile so that it can be recovered for rehabilitation of the drill site.

The amount of level surface required for safely assembling and operating a drilling rig varies with the type of rig, but is usually 200 feet by 250 feet for typical wells of 1,500 to 2,200 feet depths. Deeper wells will require larger pads because of the rig size and associated equipment. When construction of a drilling location requires cut and fill, the foundation of the drilling derrick is usually placed on a cut surface ensuring that it rests on solid ground, thereby preventing it from leaning or toppling due to settling of uncompacted soil.

In addition to the drilling platform, a reserve pit is constructed. The reserve pit is used to contain the drilling fluids and drill hole cuttings. It is usually square or oblong, but is sometimes constructed other shapes to accommodate topography. Generally, the reserve pit is six to twelve feet deep, but may be deeper to compensate for smaller length and width for deeper drilling depths. In some instances mud tanks are utilized thus eliminating the need



for a pit. For air drilling, smaller reserve pits are used; usually less than ten by ten feet and approximately six to ten feet in depth.

Depending on how the drill site is located relative to a natural drainage, it may be necessary to construct water bars or diversions to control surface runoff and erosion. The area disturbed for construction and the potential for successful revegetation depends largely on topography, soil type, climate, and the degree of disturbance.

Usually drilling activities begin shortly after the location and access road have been constructed. The drilling rig and associated equipment are moved to the location and erected.

Water for drilling is hauled or piped to the rig storage tanks or reserve pit from rivers, wells, reservoirs or private sources. Occasionally, water supply wells are drilled on or close to the drill site. Bentonite, a type of clay, is mixed with the water to form the main constituent of the drilling mud. A wide variety of other materials and chemicals may be added to enhance the mud properties. Drilling mud performs several important functions; it cools the bit, reduces the drag of the drill pipe on the sides of the bore hole, seals off any porous zones, aids in preventing an uncontrolled release of formation fluids, and carries the cuttings to the surface. High pressure air is sometimes used in place of mud. The use of mud or air is largely dependent upon the target formation, drilling depth and type of completion desired. The drilling mud or air is circulated through the drill pipe to the bottom of the hole, through the bit and up the well bore. At the surface the mud and rock cuttings are returned to the reserve pit where gravity separates the two and they are mechanically separated through a screen. The mud is recycled and returned to the system for further use. When drilling with air the cuttings are blown into the reserve pit.

The actual commencement of the drilling is referred to as "spudding in". Initially, the drilling usually proceeds rapidly due to the consolidated nature of shallow formations.

Drilling is accomplished by rotating special bits bearing a controlled portion of the drill string weight. The rig structure and associated hoisting equipment bear the remainder of the drill string's weight. The weight on the bit is controlled to maintain as vertical a hole as possible or deviate from vertical as desired, and to prevent rapid wearing of the drill bit.

The combination of rotary motion and weight on the bit causes rock to be chipped away at the bottom of the hole. As mentioned earlier, these chips are then transported to the surface where they are disposed of into the reserve pit.

The rotary motion is created by a square or hexagonal rod, called a kelly, which fits through a square or hexagonal hold in a large turntable, called a rotary table. The rotary table sits on the drilling rig floor and as the hole is deepened the kelly descends. When the kelly has gone as deep as it can, it is raised and a piece of drill pipe about 30 feet in length is attached to the drill pipe in the hole. The drill pipe is then lowered, the kelly is raised and attached



to the top of it, and drilling commences. By adding more and more drill pipe the hole is steadily deepened.

Eventually the bit becomes worn and must be replaced. To change bits, the entire string of drill pipe must be pulled from the drill string, then reassembled and again lowered into the hole and drilling is started again.

Drilling operations are continuous, 24 hours a day, seven days a week. The crews usually work three 8-hour shifts or two 12-hour shifts a day. At periodic intervals, BLM personnel, usually petroleum engineering technicians (PETs), will conduct inspections of the drilling rig and operations to ensure compliance with the approved plans in the APD. If at any time the operator wished to change the approved plans in the APD, verbal approval may be obtained but must be followed up in writing.

Upon completion of the drilling, the well is tested to determine its capability to produce hydrocarbons (oil and gas). If oil or gas is found in commercial quantities the well is completed as a producer. Installation of producing facilities generally requires little additional surface disturbances beyond that necessary for drilling. However, additional disturbance does result from pipeline and gathering line installations. Pumpjacks in this area are usually 8-10 foot in height and are usually situated over the well head on the same area where the drill rig was set up. Water disposal pits needed for the evaporation of water produced in association with hydrocarbons generally fit within the boundaries of the drilling pad. After the production facilities are installed, the remaining drilling disturbances are reclaimed.

During the production phase, BLM monitors and approves field activities needed for well and field operation and regulation. Many operations, e.g. plugging, completion in a different zone, deepening, etc., require prior approval. Others such as acidizing and fracturing do not require prior approval, but a subsequent report of operations describing the operations in detail must be filed.

If the well is not productive in commercial quantities it is considered a dry hole. Dry holes and producing wells which can no longer produce in commercial quantities must be plugged and abandoned.

### **Plugging and Abandonment**

When a well is no longer capable of producing in paying quantities and has no other beneficial use, the well should be plugged and abandoned.\* Because each well is different, the plugging program for that well must be carefully designated. Federal minerals plugging programs are designed to:

- a) Prevent fluid migration between zones



b) Protect mineral resources from damage

c) Isolate producing zones

After the physical plugging is completed, the surface is reclaimed, per stipulations in the APD or the surface owner agreement.

## **APPENDIX C**

### **PANOCHE/COALINGA AREA OF CRITICAL ENVIRONMENTAL CONCERN GUIDELINES FOR OIL & GAS OPERATIONS IN T&E ANIMAL HABITAT**

Maintain the existing ORV designations in the Panoche Hills area. Vehicles limited to designated routes.

Surface disturbing activities such as road construction, ground leveling, mining or oil and gas exploration and development will be evaluated for potential adverse impacts to these resources. An on-site field exam will be undertaken on all applications within the ACEC. Consultations with the U.S. Fish and Wildlife Service, in accordance with Section 7 of the Endangered Species Act, will be conducted if appropriate. If necessary protective measures will be taken. These measures can be separated into pre-development, development, and post-development. Such measures will be useful not only in evaluating oil and gas exploration (APDs, etc.) but also in developing mining plans of operations under the 3809 regulations. Not all measures will apply in every situation. Each surface disturbance action will be evaluated on a case by case basis for applicability of the following measures.

#### **Pre-Development Protective Measures**

- Installation of temporary fences along the margin of pad sites on oil and gas developments to eliminate off-site vehicle impacts to undisturbed habitat.
- Access roads and pipeline should be planned to utilize existing roads and trails. Where new roads are proposed, route to avoid sensitive habitat features such as shrubs, small mammal and rodent burrows and washes.
- Compensation both on-site and off-site: Rehabilitate additional acreage through reseeding, installation of artificial dens, closure/rehab of roads in other lease areas, etc.
- Seasonal restriction for operational activities to minimize vehicle traffic, noise, etc. during sensitive periods such as denning, nesting, etc.
- Formal programs to increase employee awareness of local wildlife concerns emphasizing unique habitat features and values. This is important to the contractor (s) as well as the applicant.
- Maintain unique or limiting topographic features (will vary from site to site).
- No surface occupancy should be considered in critical or sensitive habitat areas.



- Employees and contractors should be prohibited from carrying firearms onto the worksite.

### **Developmental Protective Measures**

- Where pipelines/steam lines are needed, lay above ground (hang above ground across major washes). Align with roads where possible.
- Size and alignment (or orientation) of pads should be determined to minimize surface disturbance and habitat loss, yet accommodate construction activities (i.e., lengthwise or parallel to existing roads, short side toward sensitive features). Revegetate those portions of the pads not needed for production purposes as soon as possible.
- Waste water should be properly contained and/or removed to a designated disposal site.
- Stockpile topsoil from surface disturbing activities to be used in conjunction with revegetation efforts.
- Maintain buffer zones around sensitive habitat features (minimum 200 feet from active or inactive San Joaquin kitfox dens, minimum 100 feet from all intermittent streams, 100 feet from dry washes in blunt-nosed leopard lizard habitat and minimum 200 feet from giant kangaroo rat colonies). Fencing will be used if necessary.
- Keep number of roads to a minimum (one to two access points per well).
- Consolidate maintenance activities to reduce human disturbances.
- Fence/cover all existing and active sumps with fine wire mesh to prevent the entrapment of animals.

### **Post-Development Protection Measures**

- Abandonments will be rehabed and re-contoured as close as possible to the original contour and condition. The determination for re-contouring abandoned well sites will consider possible impacts to RTE species. In some cases, where natural revegetation has occurred around the margins of well sites and RTE species are known to inhabit the site, it may be desirable to rip and reseed pads and roads but avoid disturbing naturally revegetated areas by re-contouring.

- Ripping, reseeding and recontouring will be done by the lessee as approved by BLM to all roads, pads, sumps, and all other past surface disturbances (including oil spills from historic operations) not of value to the leasehold operation.
- Reseeding will consist of environmentally compatible plant species (saltbush) in all disturbed areas within construction zones, as well as any additional locations agreed to for the benefit of RTE species and surface protection from erosion.
- Specifications for seeding will include timeframes, rates of seed application, type of seed.
- Areas to be rehabed should be delineated in writing, by map, and staked/flagged on site.
- If in an active field, rehabilitation efforts should be conducted within one year after construction operations have ended.
- If necessary, fence (or block with physical barriers) revegetated sites from vehicular or livestock access.
- Dispose of all well site debris, including equipment, pipelines, and garbage in an acceptable manner (this means removal to a designated disposal site for contaminated soil and/or debris).

In addition to the protective measure listed above, compensation may be required in the form of on-site or off-site habitat enhancement (installation of guzzlers, conversion of oil and gas wells to water wells, seeding of native shrub species, etc.). Project applicants may be required to provide funds for purchase of off-site lands.



## APPENDIX D

### SPECIAL STATUS PLANT SPECIES WITH LOW POTENTIAL TO BE AFFECTED BY OIL & GAS ACTIVITIES

<u>SPECIES</u>	<u>STATUS</u>
<i>Agrostis hendersonii</i>	2
<i>Allium hickmanii</i>	1
<i>Arctostaphylos cruzensis</i>	2
<i>Arctostaphylos edmundsii</i> v. <i>edmundsii</i>	2
<i>Arctostaphylos edmundsii</i> v. <i>parvifolia</i>	2
<i>Arctostaphylos montereyensis</i>	2
<i>Arctostaphylos pumila</i>	2
<i>Arctostaphylos pseudopungens</i>	2
<i>Astragalus ravenii</i>	2
<i>Astragalus tener</i> v. <i>titi</i>	1
<i>Atriplex vallicola</i>	2
<i>Calycadenia hooveri</i>	2
<i>Calyptridium pulchellum</i>	2
<i>Camissonia hardhamiae</i>	2
<i>Camissonia sierrae</i> ssp <i>alticola</i>	2
<i>Carpenteria californica</i>	1
<i>Ceanothus ferrisae</i>	1
<i>Chamaesyce hooveri</i>	1
<i>Chlorogalum purpureum</i> <i>purpureum</i>	1
<i>Chorizanthe pungens</i> v. <i>pungens</i>	2
<i>Cirsium fontinale</i> v. <i>campylon</i>	2
<i>Cistanthe pulchella</i>	2
<i>Clarkia rostrata</i>	2
<i>Collinsia antonina</i>	2
<i>Collomia rawsoniana</i>	1
<i>Cordylanthus mollis</i> ssp <i>hispidus</i>	2
<i>Cordylanthus nidularius</i>	1
<i>Cordylanthus palmatus</i>	E
<i>Cordylanthus rigidus</i> ssp <i>littoralis</i>	2
<i>Coreopsis hamiltonii</i>	2
<i>Cupressus goveniana</i>	2
<i>Cupressus macrocarpa</i>	2
<i>Delphinium hutchinsoniae</i>	2
<i>Ericameria fasciculata</i>	2
<i>Eriogonum butterworthianum</i>	2

<i>Eriogonum temblorense</i>	2
<i>Eriophyllum nubigenum</i>	2
<i>Eryngium racemosum</i>	2
<i>Eryngium spinosepalum</i>	2
<i>Erysimum menziesii</i> ssp. <i>menziesii</i>	1
<i>Fremontodendron mexicanum</i>	2
<i>Fritillaria falcata</i>	2
<i>Fritillaria viridea</i>	2
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	1
<i>Galium californicum</i> ssp. <i>lucienne</i>	2
<i>Gratiola hetersepala</i>	2
<i>Helianthella castanea</i>	2
<i>Holocarpha macradenia</i>	1
<i>Ivesia unguiculata</i>	-
<i>Layia carnosa</i>	1
<i>Layia discoidea</i>	2
<i>Layia jonesii</i>	2
<i>Lewisia congdonii</i>	3
<i>Lupinus citrinus</i>	2
<i>Lupinus ludovicianus</i>	2
<i>Lupinus spectabilis</i>	2
<i>Lupinus tidestromii</i> v. <i>tidestromii</i>	1
<i>Malacothrix abbotii</i>	2
<i>Malacothrix saxatilis</i> v. <i>arachnoidea</i>	2
<i>Microseris decipiens</i>	2
<i>Monardella leucocephala</i> extinct?	1
<i>Neostapfia colusana</i>	1
<i>Orcuttia inaequalis</i>	1
<i>Orcuttia pilosa</i>	1
<i>Orthocarpus campestris</i> v. <i>succulentus</i>	2
<i>Phacelia ciliata</i> v. <i>opaca</i>	2
<i>Phacelia phacelioides</i>	2
<i>Plagiobothrys hystriculus</i>	2
<i>Pogogyne clareana</i>	2
<i>Potentilla hickmanii</i>	1
<i>Pseudobahia bahiifolia</i>	2
<i>Pseudobahia peirsonii</i>	1
<i>Sanicula maritima</i>	2
<i>Sidalcea keckii</i>	1
<i>Streptanthus albidus</i> ssp. <i>albidus</i>	1
<i>Streptanthus callistus</i>	2
<i>Streptanthus hispidus</i>	2
<i>Streptanthus insignis</i> <i>lyonii</i>	2
<i>Trifolium polyodon</i>	1



Trifolium trichocalyx	1
Tropidocarpum capparideum extinct?	2
Tuctoria greenei	1
Camissonia benitensis	T
Fritillaria falcata	2
Fritillaria viridea	2
Gratiola heterosepala	2
Layia discoidea	2
Orcuttia inaequalis	1
Orthocarpus campestris v. succulentus	2

#### SPECIAL STATUS PLANT SPECIES DEFINITIONS

Threatened or Endangered (T&E) - are those officially listed as threatened or endangered by the Secretary of the Interior under the provisions of the Endangered Species Act.

Candidate Species (C1, C2, C3) - are those species designated as Federal candidates (categories 1 and 2) for listing as threatened or endangered by the U.S. Fish & Wildlife Service.

State Listed Species - are those proposed for listing or listed by California in a category (rare, threatened, or endangered) implying potential endangerment or extinction.

Sensitive Species - are those designated by the California State Director of the BLM - typically these occur in small and/or widely dispersed populations - Panoche peppergrass may be considered as such in the near future so this EIS treats Panoche peppergrass as a special status species.

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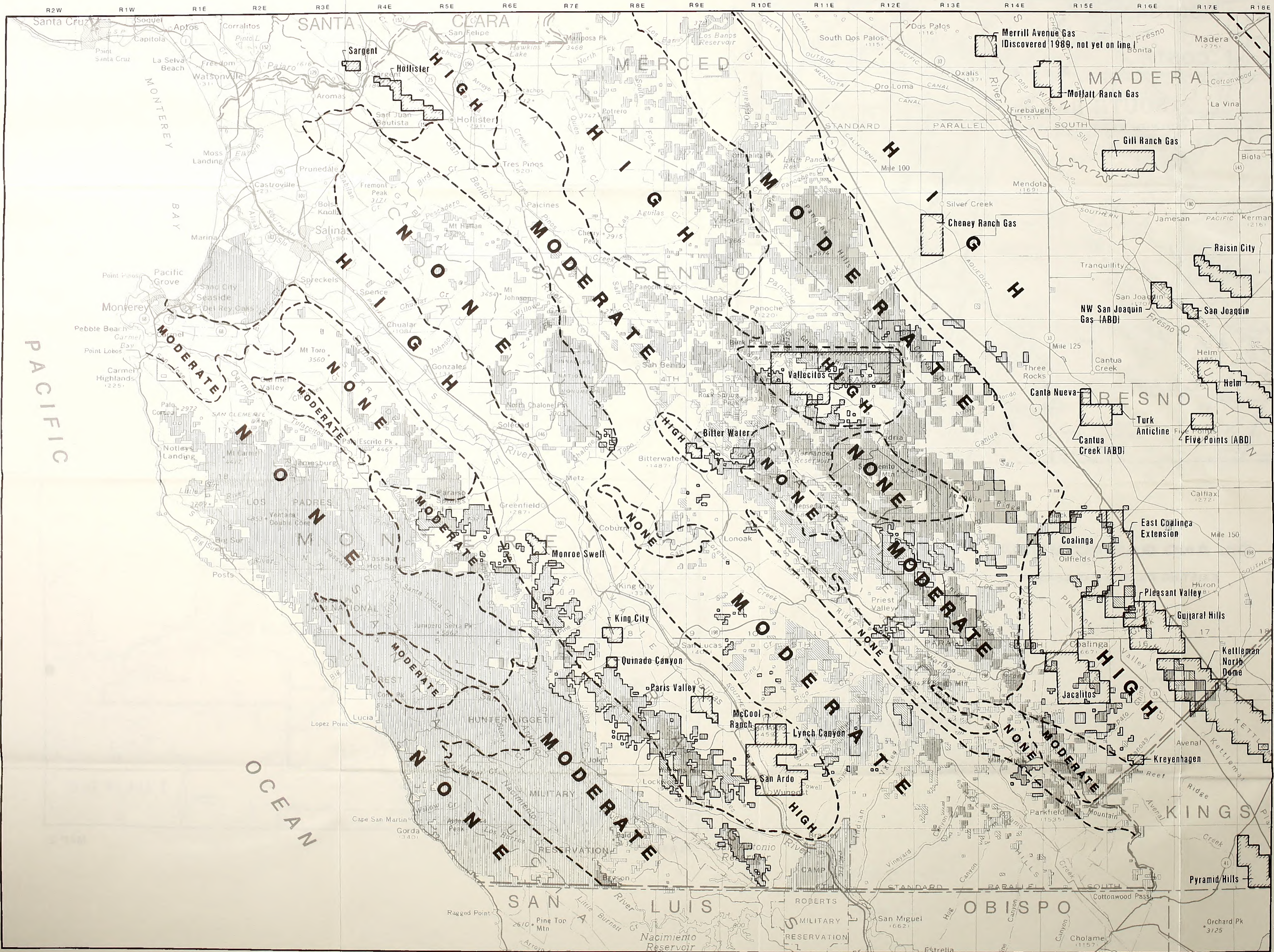


**Map 2**

**O&G Potential;  
Existing O&G Leases**



OIL AND GAS POTENTIAL  
EXISTING OIL AND GAS LEASES



**LEGEND**

Resource Area Boundary  
County Lines  
Public Lands (BLM)  
Existing Oil and Gas Leases  
Existing Oil Fields  
OIL AND GAS POTENTIAL OCCURRENCE

**Explanation of Classification\***

HIGH: Demonstrated existence of (a) source rock, (b) thermal maturation, and (c) reservoir strata exhibiting permeability and/or porosity, and traps.

MODERATE: Geophysical or geological indications that (a), (b), and (c) above are present.

LOW: Specific indications that one or two of (a), (b), or (c) may not be present.

NONE: Demonstrated absence of (a), (b), and (c) that precludes the occurrence of oil and gas.

\*As prescribed by WO IM 89-780, September 27, 1989.

**REFERENCE**

Beyer, L. A., and Bartow, J. A., 1987, Summary of Geology and Petroleum Plays Used to Assess Undiscovered Recoverable Petroleum Resources: USGS Open-File Report 87-4502, 80 p.

**Federally Owned Minerals**

All Minerals  
Coal Only  
Oil and Gas Only  
Oil, Gas and Coal Only  
Other

Scale: 1:250,000



HOLLISTER  
RESOURCE  
MANAGEMENT  
PLAN



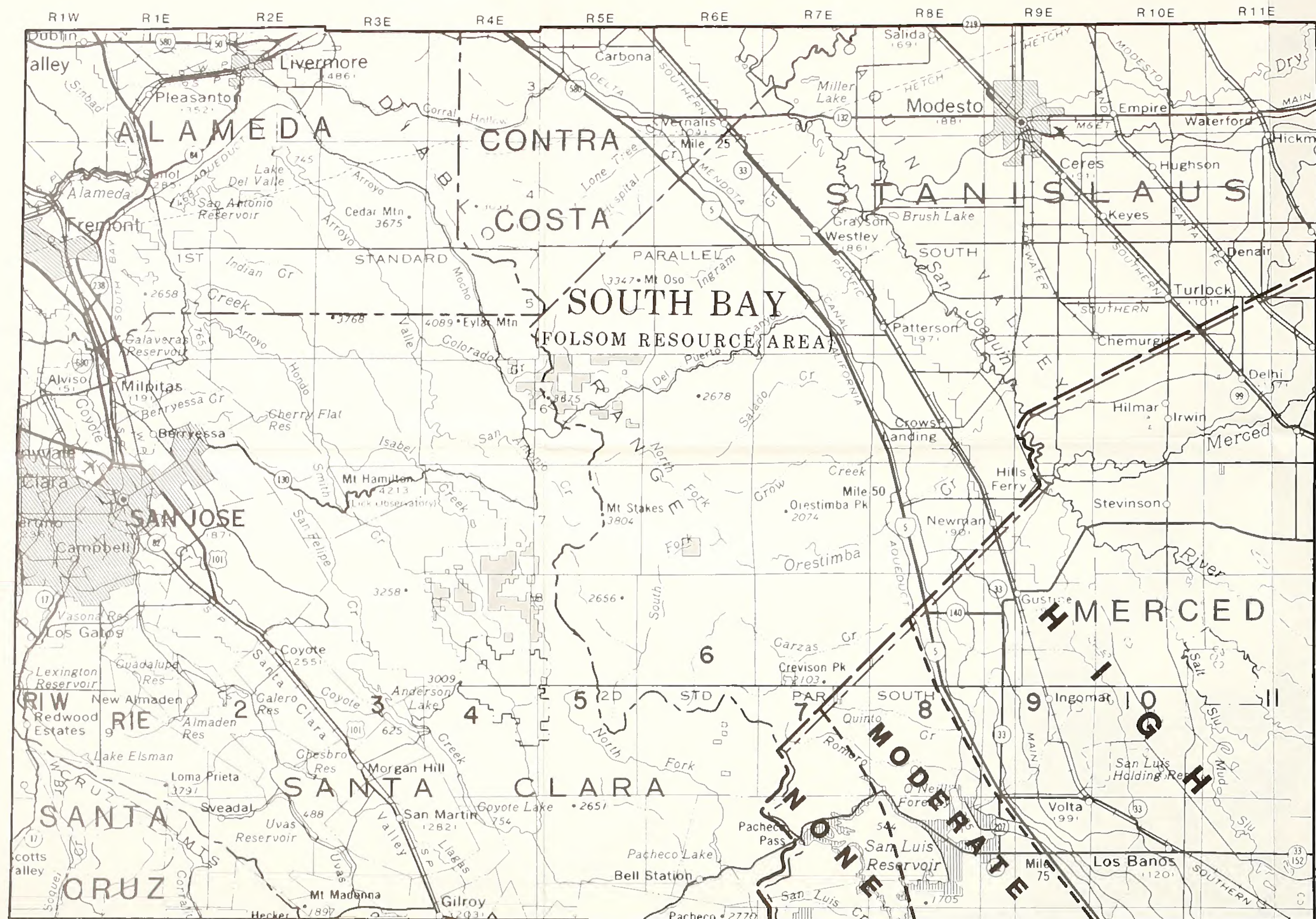


PLATE C

## OIL AND GAS POTENTIAL

EXISTING OIL AND GAS LEASES

- LEGEND**
- Resource Area Boundary
  - County Lines
  - Public Lands (BLM)
  - NONE Existing Oil and Gas Leases
  - NONE Existing Oil Fields
  - OIL AND GAS POTENTIAL OCCURRENCE

**Explanation of Classification\***

**HIGH:** Demonstrated existence of (a) source rock, (b) thermal maturation, and (c) reservoir strata exhibiting permeability and/or porosity, and traps.

**MODERATE:** Geophysical or geological indications that (a), (b), and (c) above are present.

**LOW:** Specific indications that one or two of (a), (b), or (c) may not be present.

**NONE:** Demonstrated absence of (a), (b), and (c) that precludes the occurrence of oil and gas.

\*As prescribed by WO IM 89-780, September 27, 1989

### REFERENCE

Beyer, L. A., and Barlow, J. A. 1987. Summary of Geology and Petroleum Plays Used to Assess Undiscovered Recoverable Petroleum Resources. USGS Open-File Report 87-4502, 80 p.

## HOLLISTER RESOURCE MANAGEMENT PLAN



Scale: 1:250,000

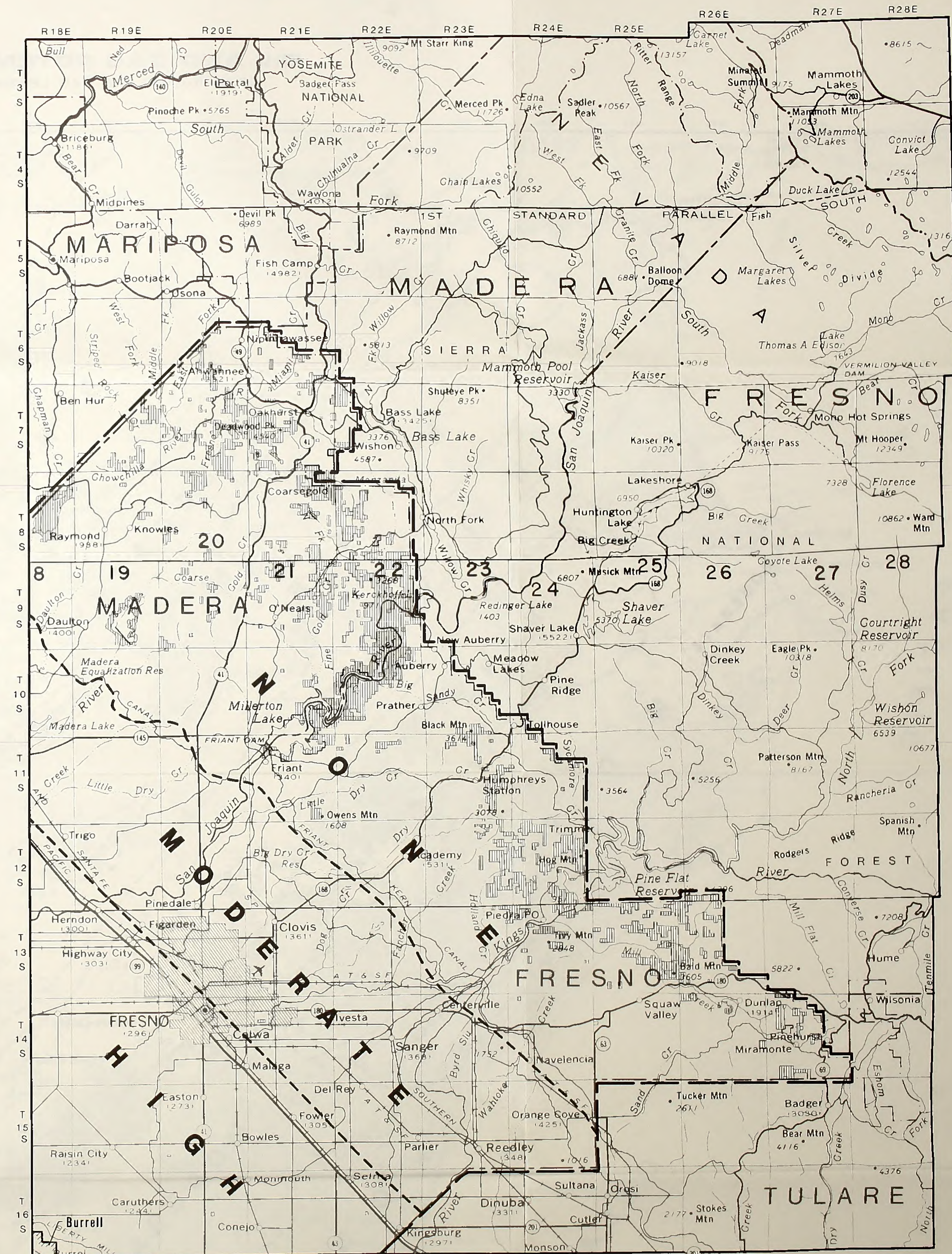


PLATE B

MAP 2





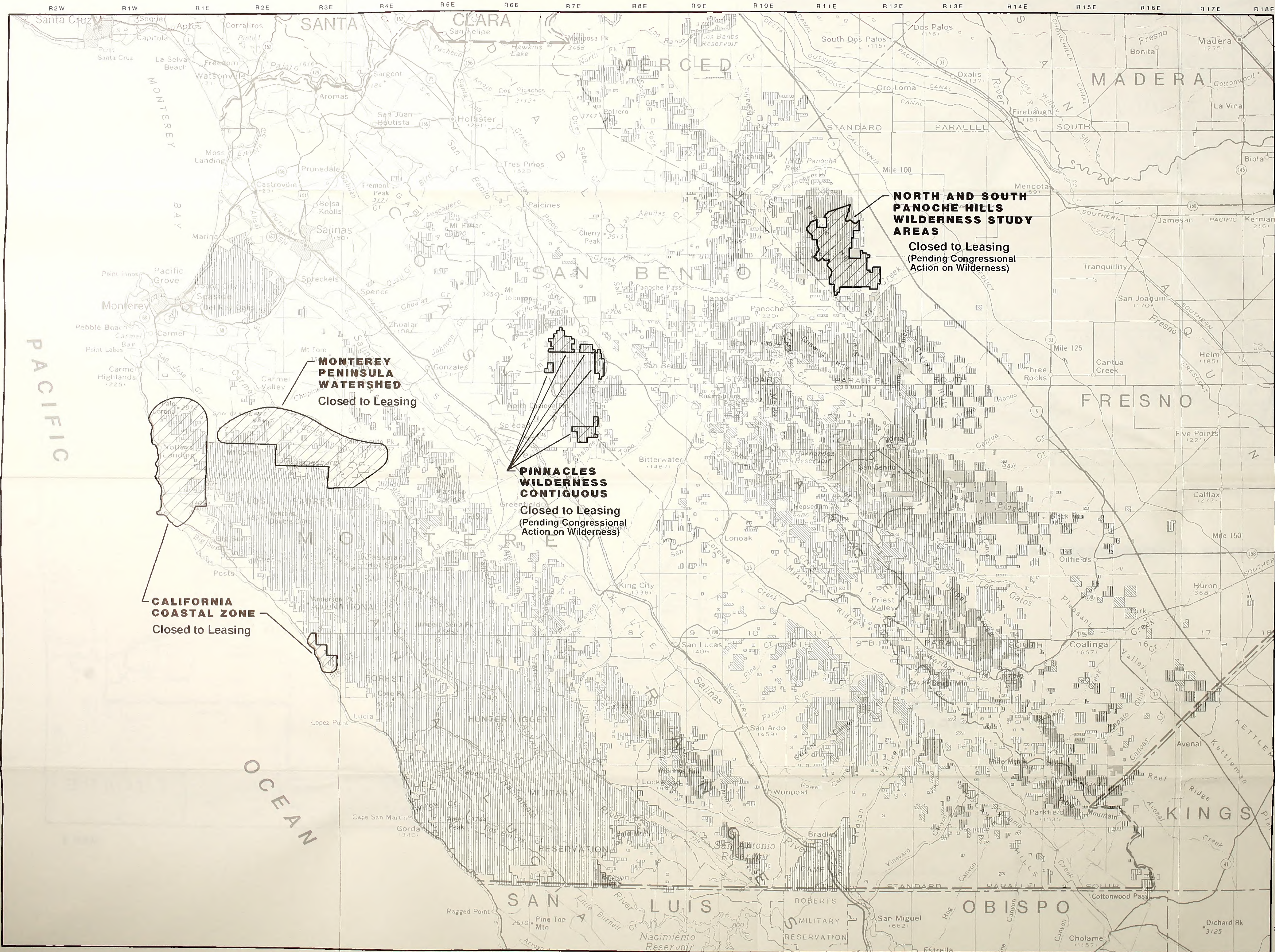


**Map 3**

**Alternative "A"  
Current Management**



ALTERNATIVE A--CURRENT MANAGEMENT

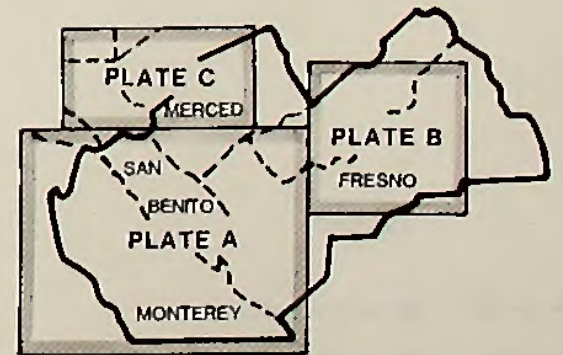


- LEGEND
- Resource Area Boundary
  - County Lines
  - Public Lands (BLM)
  - Closed to Leasing

- Federally Owned Minerals
- All Minerals
  - Coal Only
  - Oil and Gas Only
  - Oil, Gas and Coal Only
  - Other

Scale: 1:250,000

HOLLISTER RESOURCE AREA



HOLLISTER RESOURCE MANAGEMENT PLAN



BUREAU OF LAND MANAGEMENT  
BAKERSFIELD DISTRICT



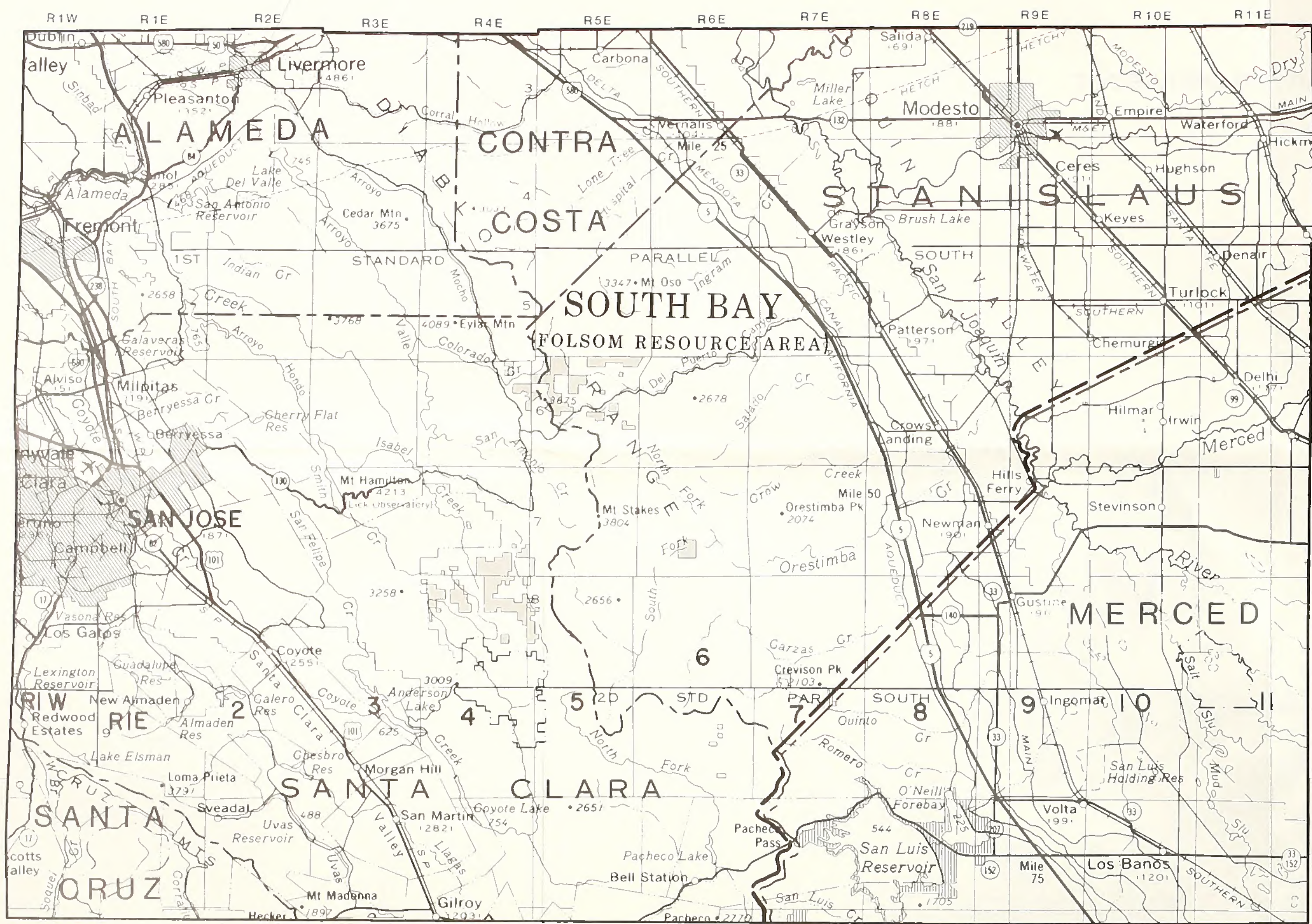
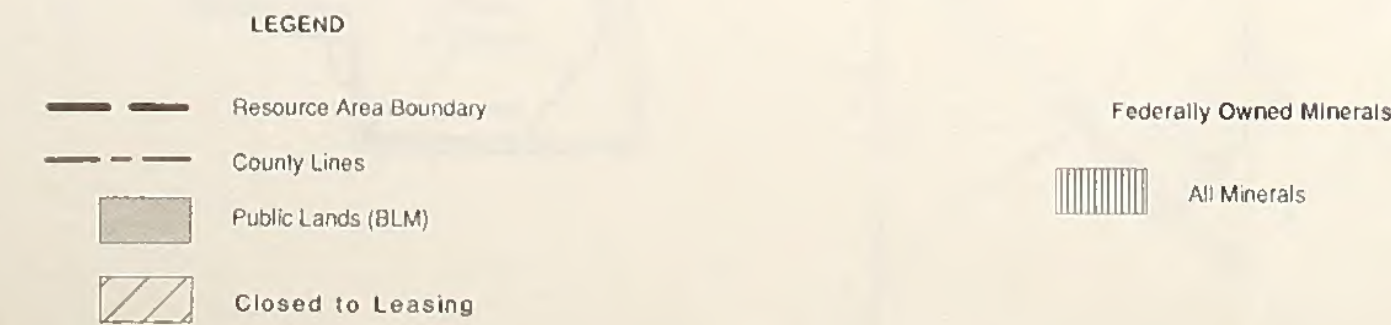
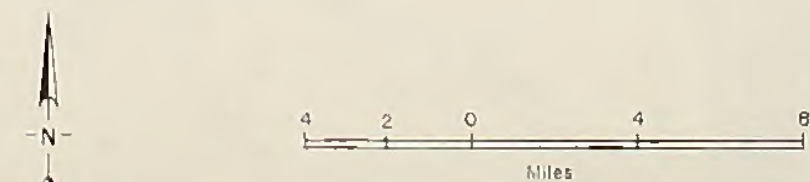


PLATE C

## ALTERNATIVE A--CURRENT MANAGEMENT



## HOLLISTER RESOURCE MANAGEMENT PLAN



Scale: 1:250,000

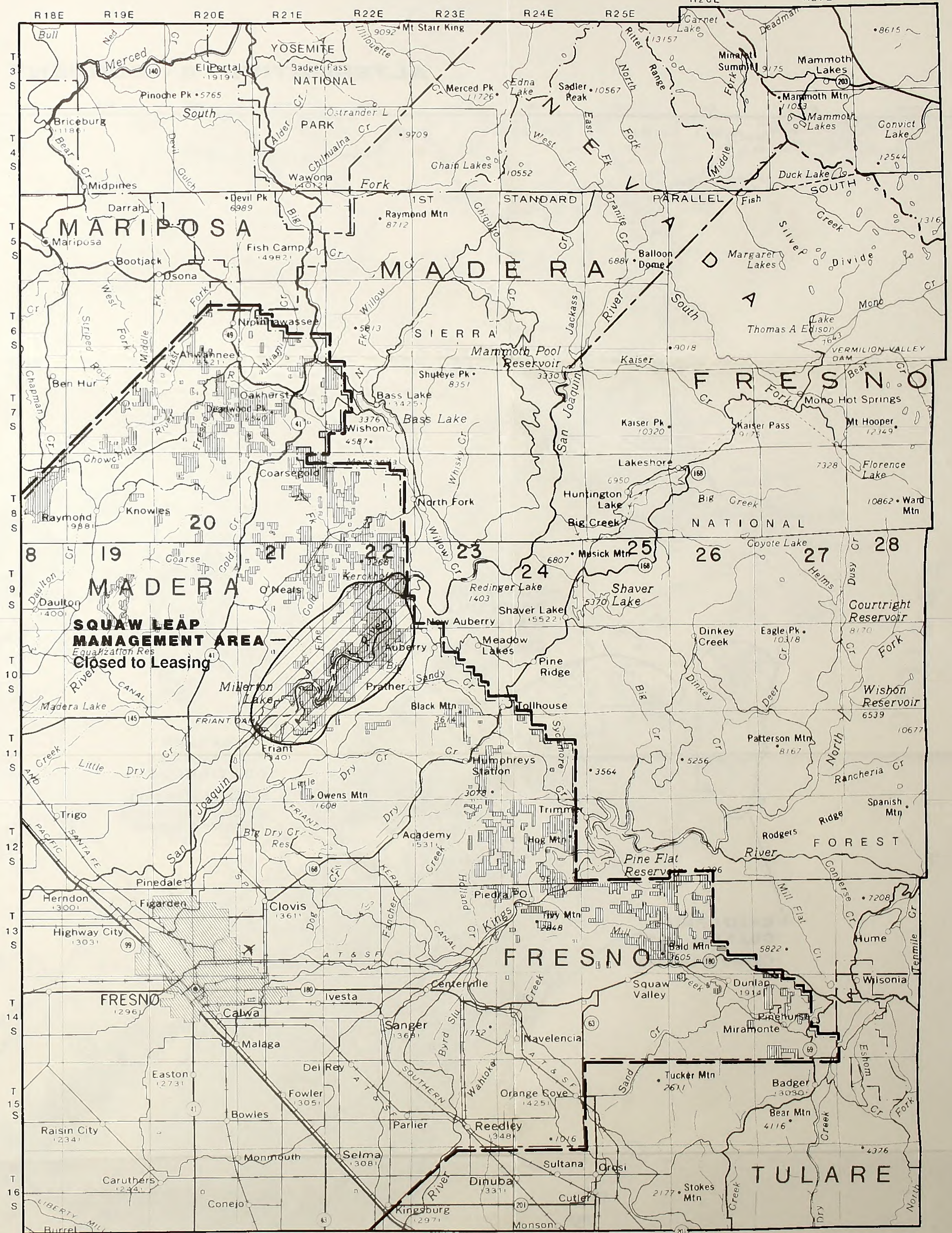


PLATE B

MAP 3







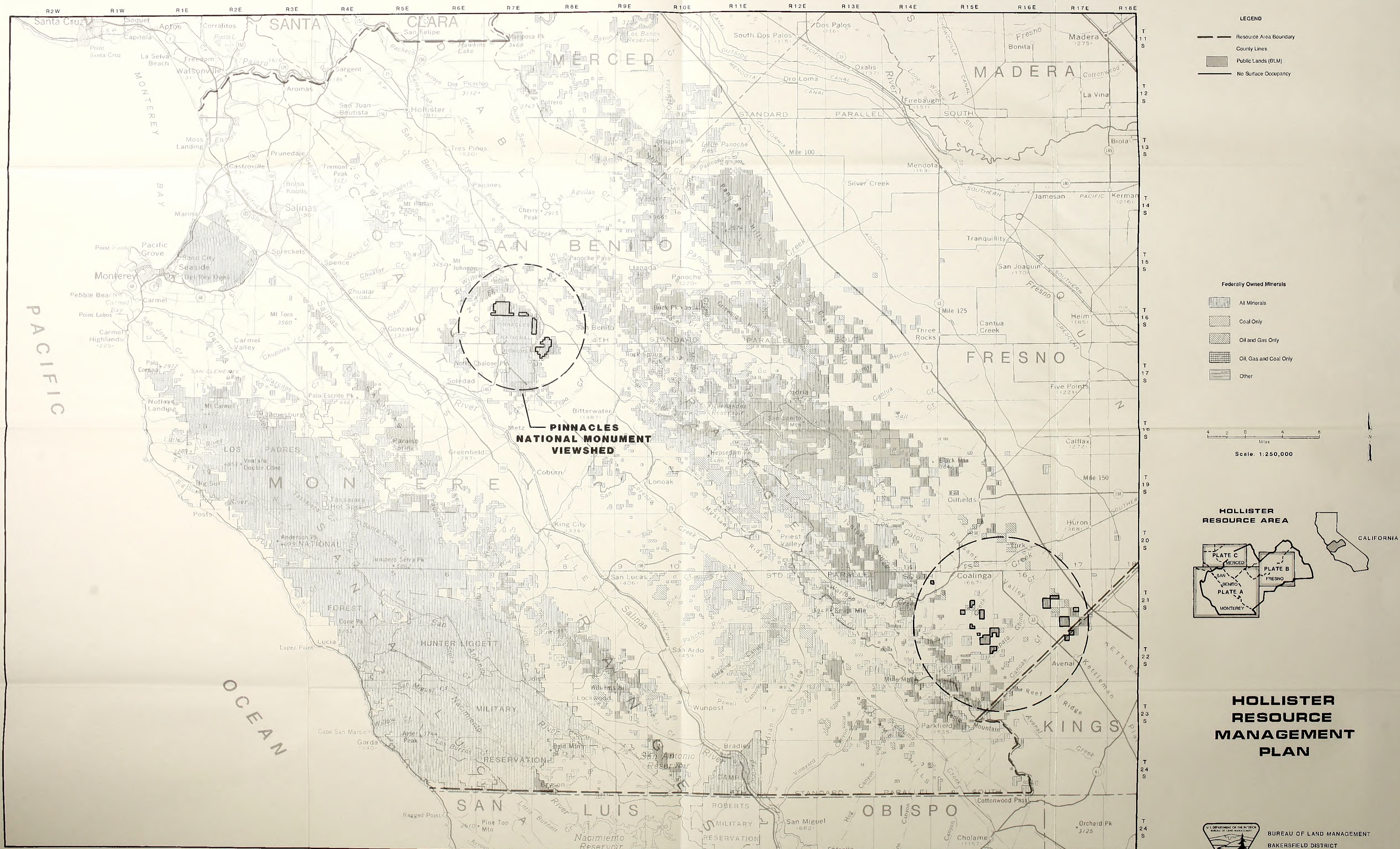
**Map 4**

**Alternative "C"  
NSO on T&E Plant Populations/  
Pinnacles Viewshed**



# ALTERNATIVE C -- ENDANGERED SPECIES STIPULATION ON T&E PLANT POPULATIONS

NO SURFACE OCCUPANCY ON PINNACLES VIEWSHED





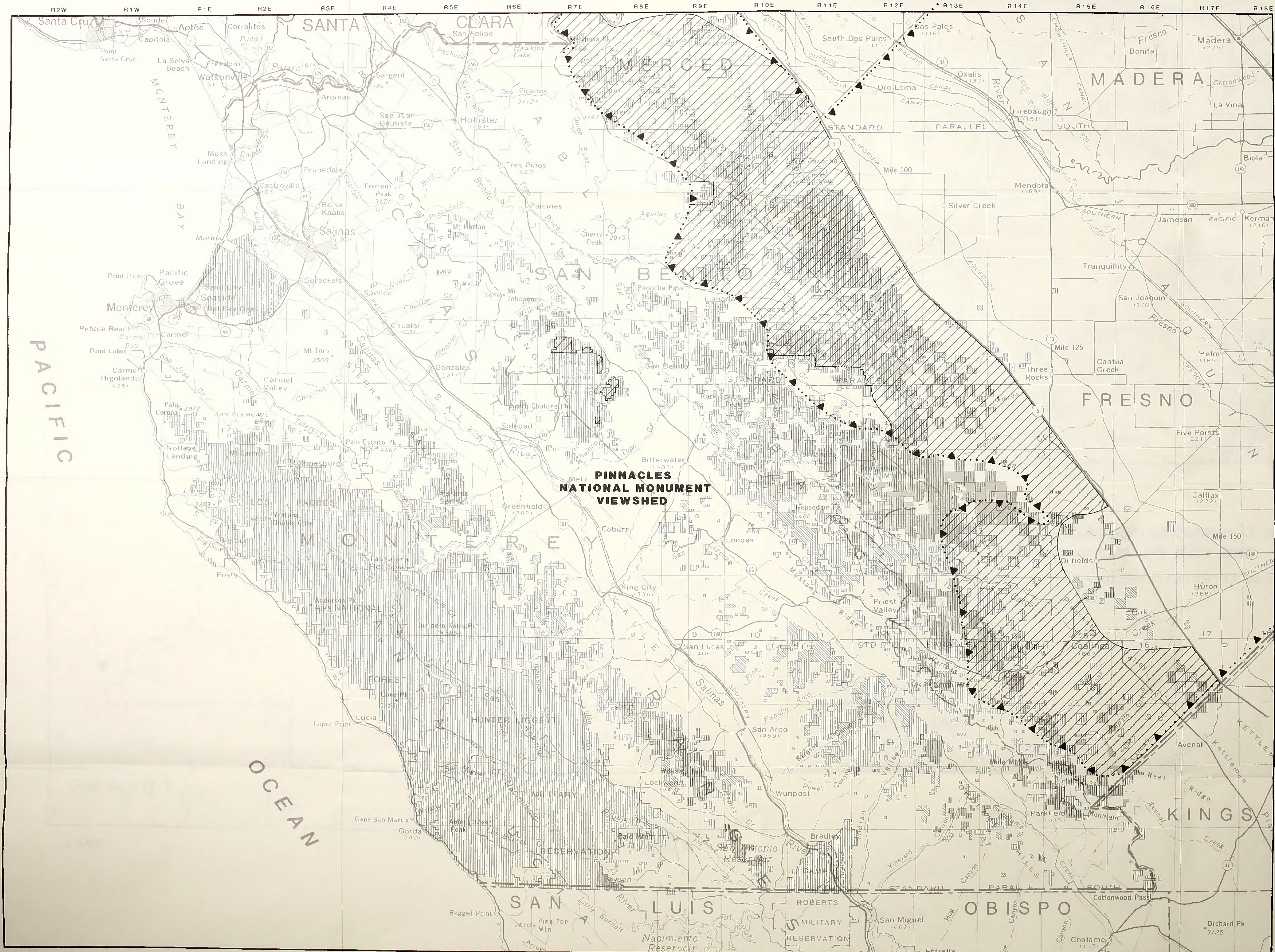
**Map 5**

**Alternative "D"  
NSO on T&E Plant Habitat/  
Pinnacles Viewshed**



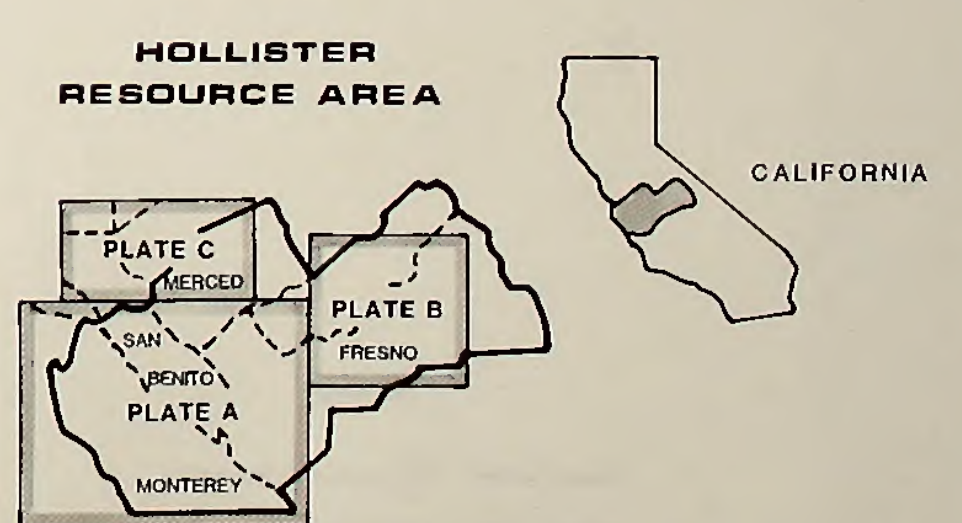
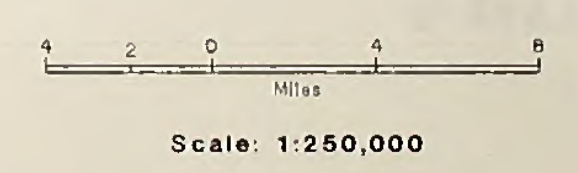
# ALTERNATIVE D -- ENDANGERED SPECIES STIPULATION ON T&E PLANT HABITAT

NO SURFACE OCCUPANCY ON PINNACLES VIEWSHED

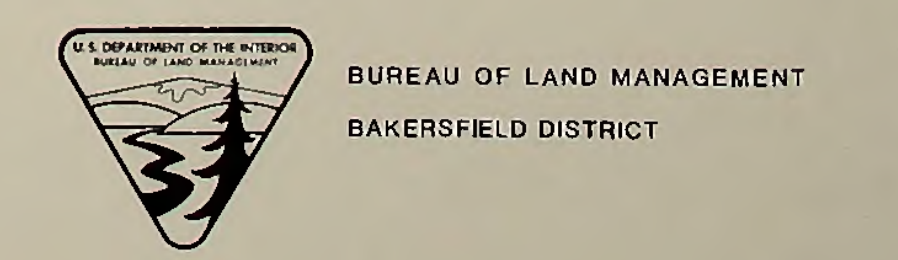


- LEGEND**
- Resource Area Boundary
  - County Lines
  - Public Lands (BLM)
  - Threatened and Endangered Plant Species Habitat  
(Includes the California Jewel Flower, Hoover's Erismum and San Joaquin Woolly-Threads)
  - Threatened and Endangered Stipulations

- Federally Owned Minerals**
- All Minerals
  - Coal Only
  - Oil and Gas Only
  - Oil, Gas and Coal Only
  - Other



## HOLLISTER RESOURCE MANAGEMENT PLAN





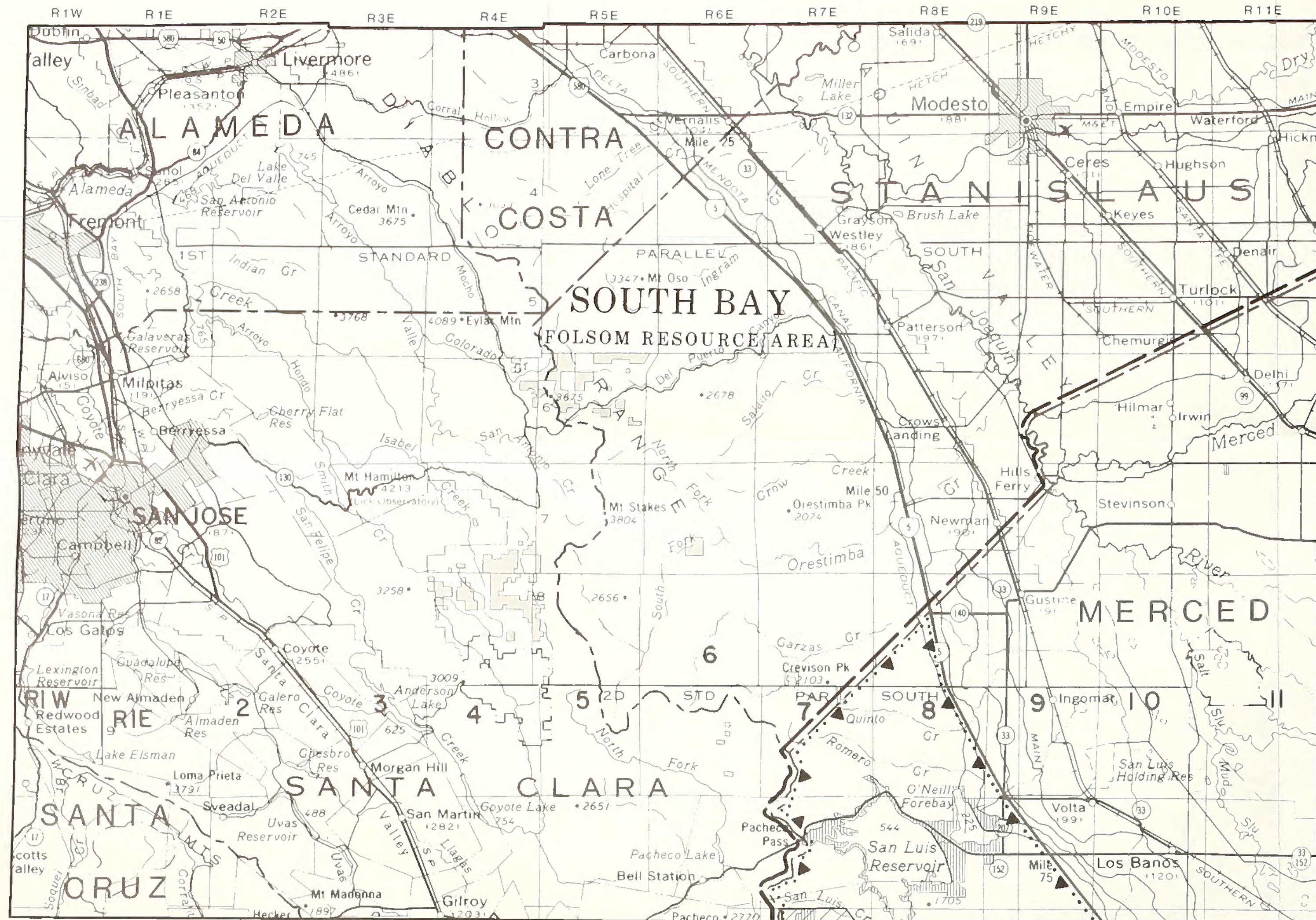


PLATE C

## ALTERNATIVE D -- ENDANGERED SPECIES STIPULATION ON T&E PLANT HABITAT

NO SURFACE OCCUPANCY ON PINNACLES VIEWSHED

# HOLLISTER RESOURCE MANAGEMENT PLAN

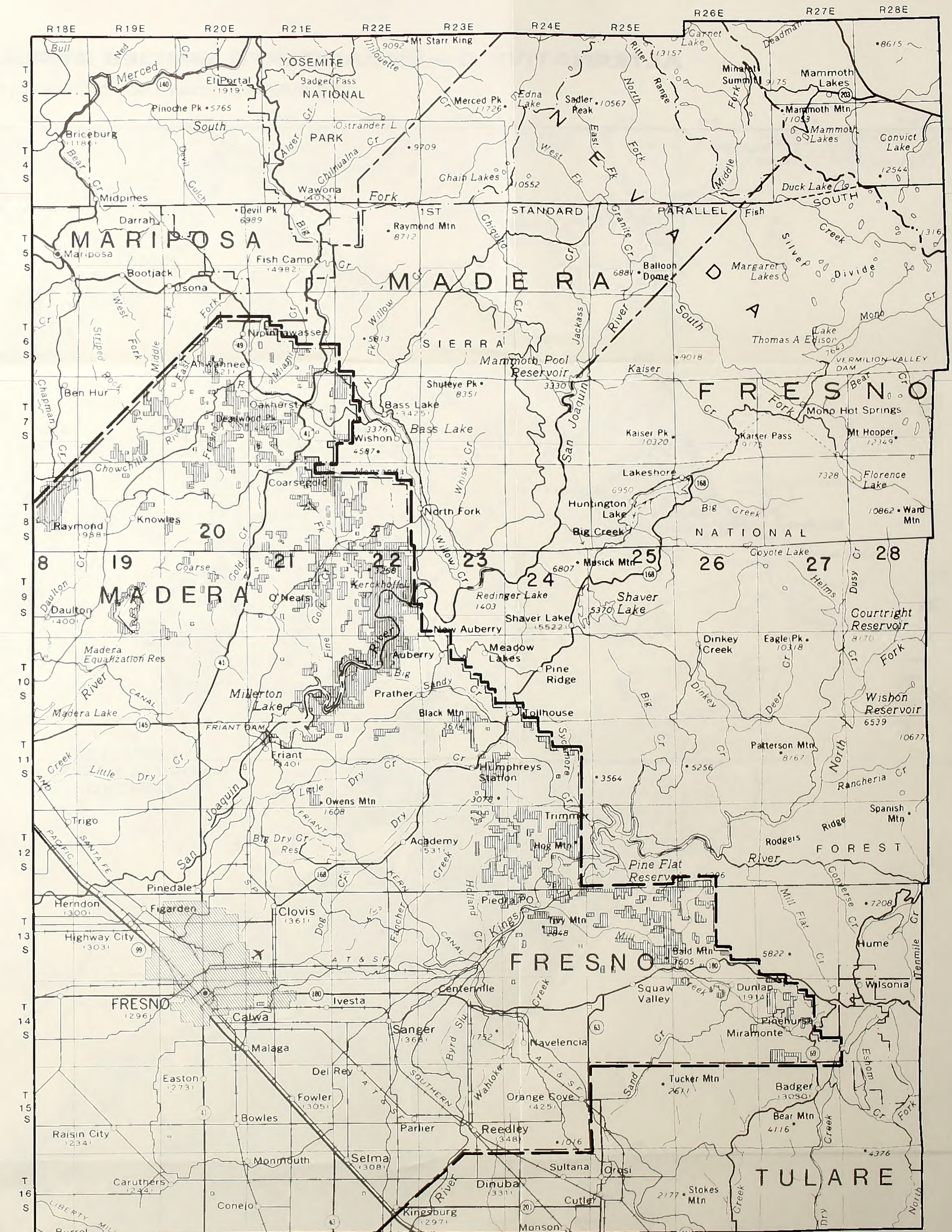


PLATE B





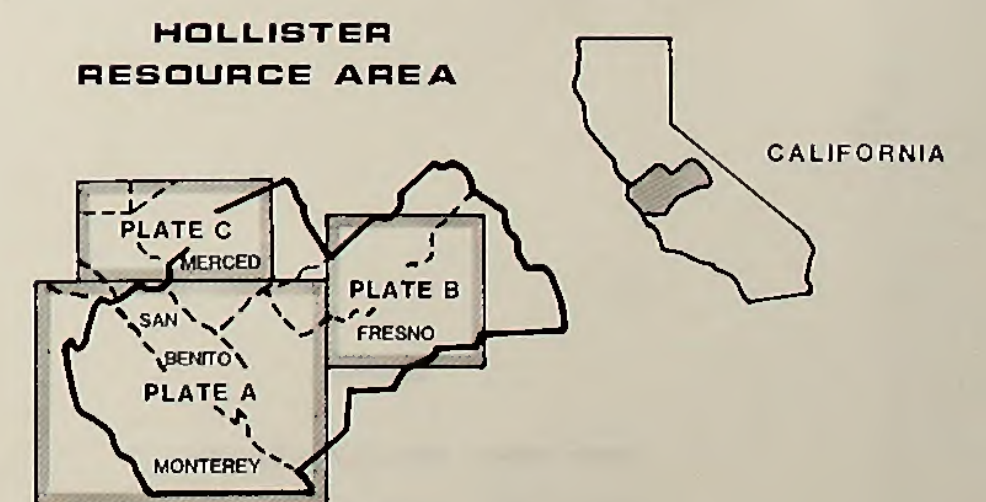
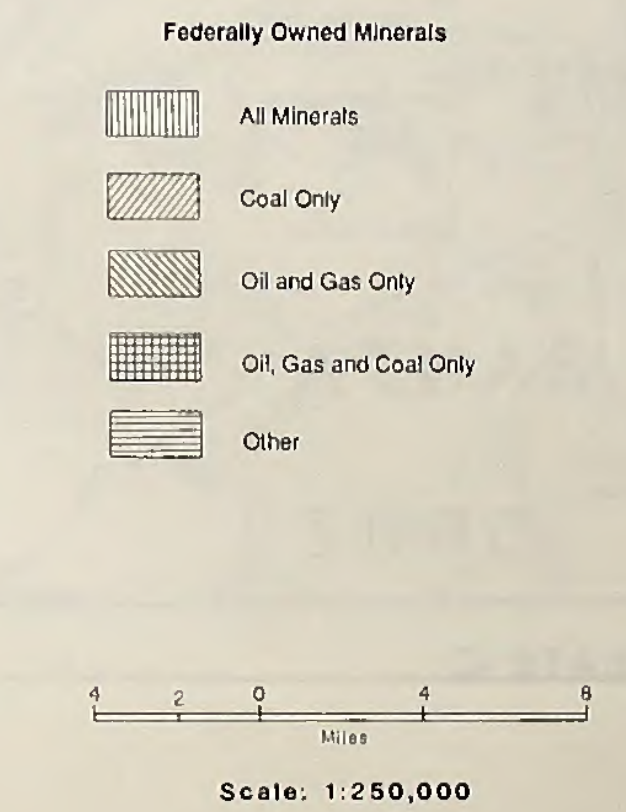
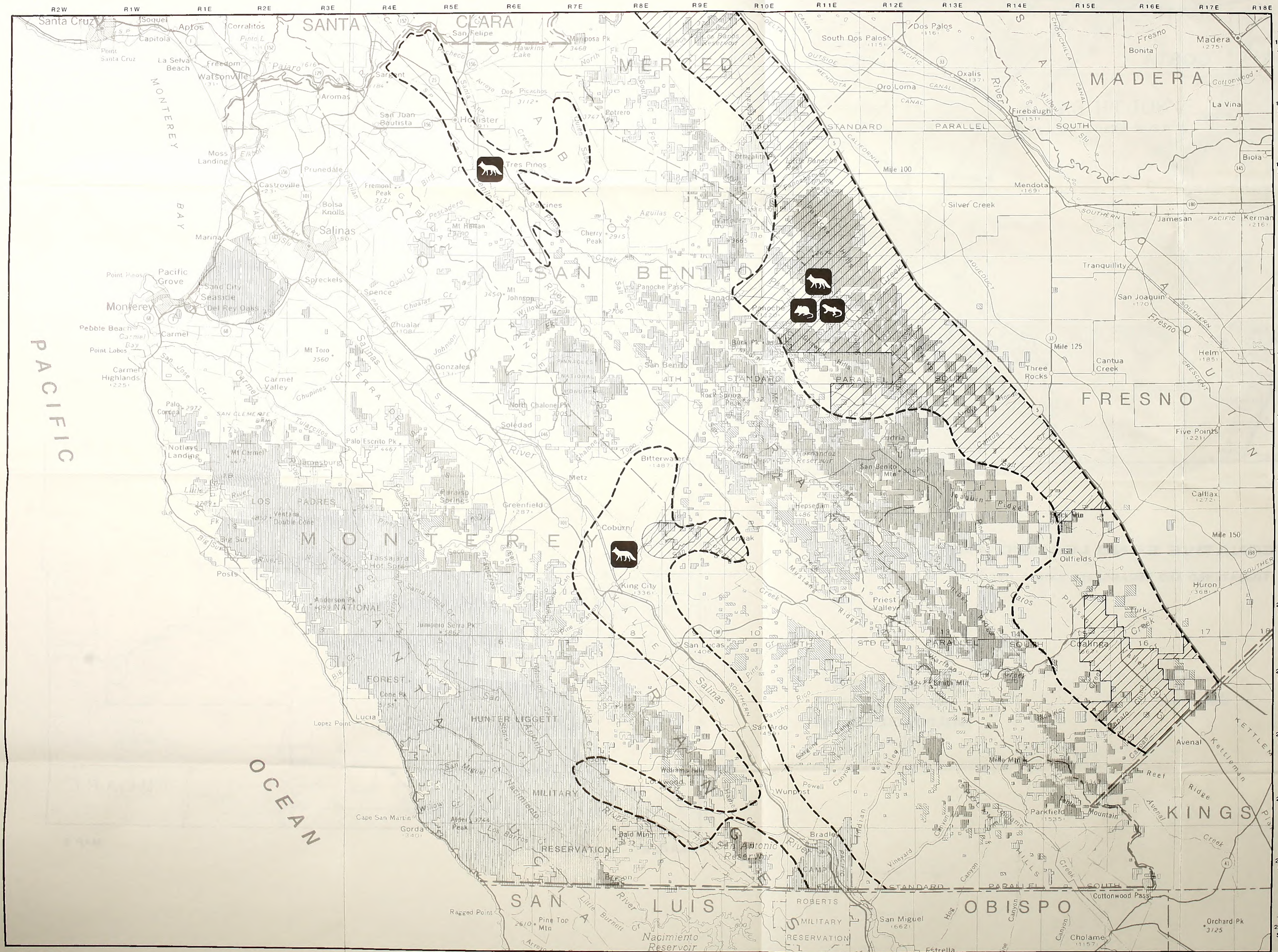


**Map 6**

**Alternative "E"  
No Leasing in T&E Animal Habitat**



ALTERNATIVE E -- NO LEASING AREAS  
THREATENED AND ENDANGERED ANIMAL HABITAT



**HOLLISTER  
RESOURCE  
MANAGEMENT  
PLAN**



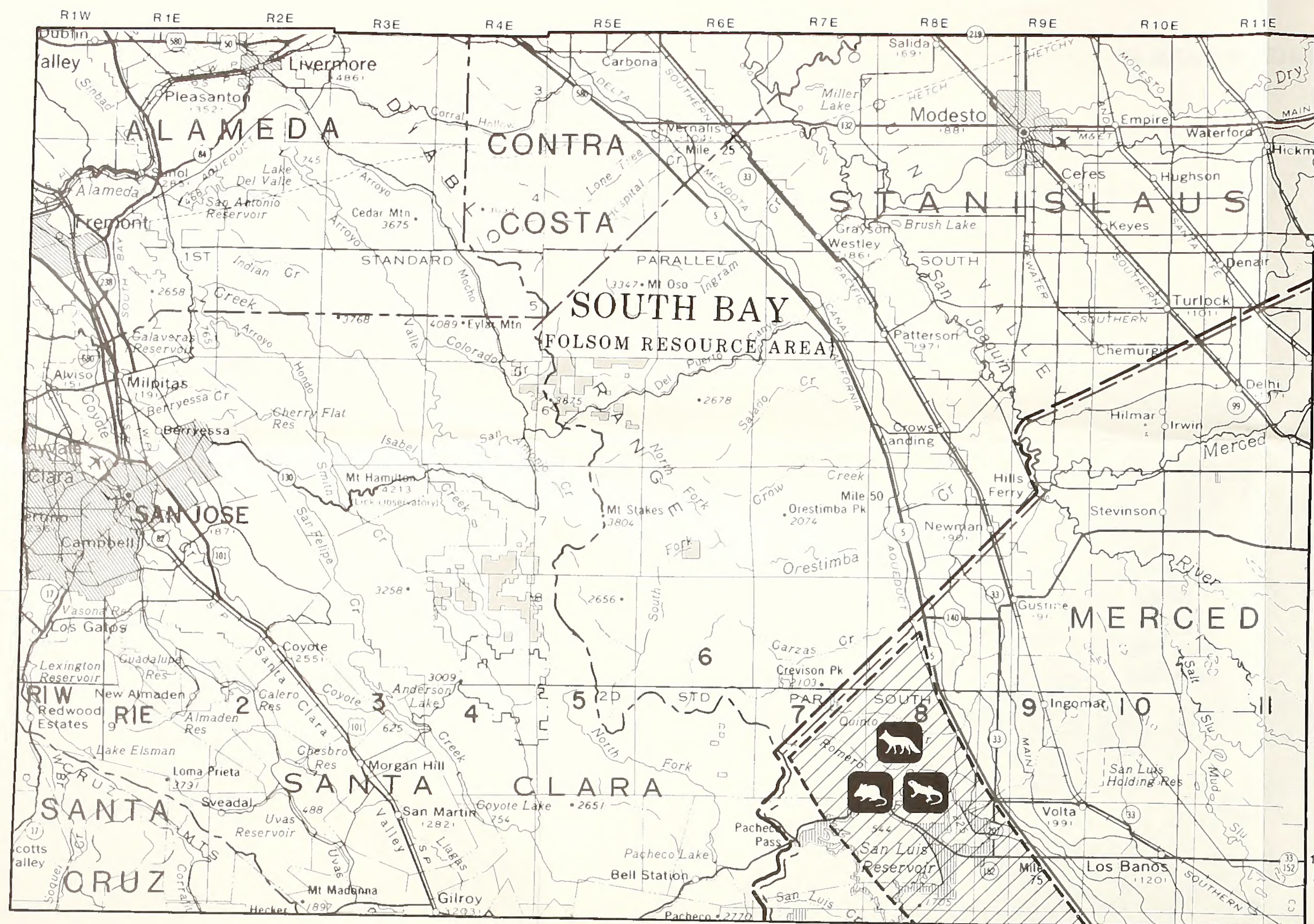


PLATE C

## ALTERNATIVE E--NO LEASING AREAS

THREATENED AND ENDANGERED ANIMAL HABITAT



## HOLLISTER RESOURCE MANAGEMENT PLAN

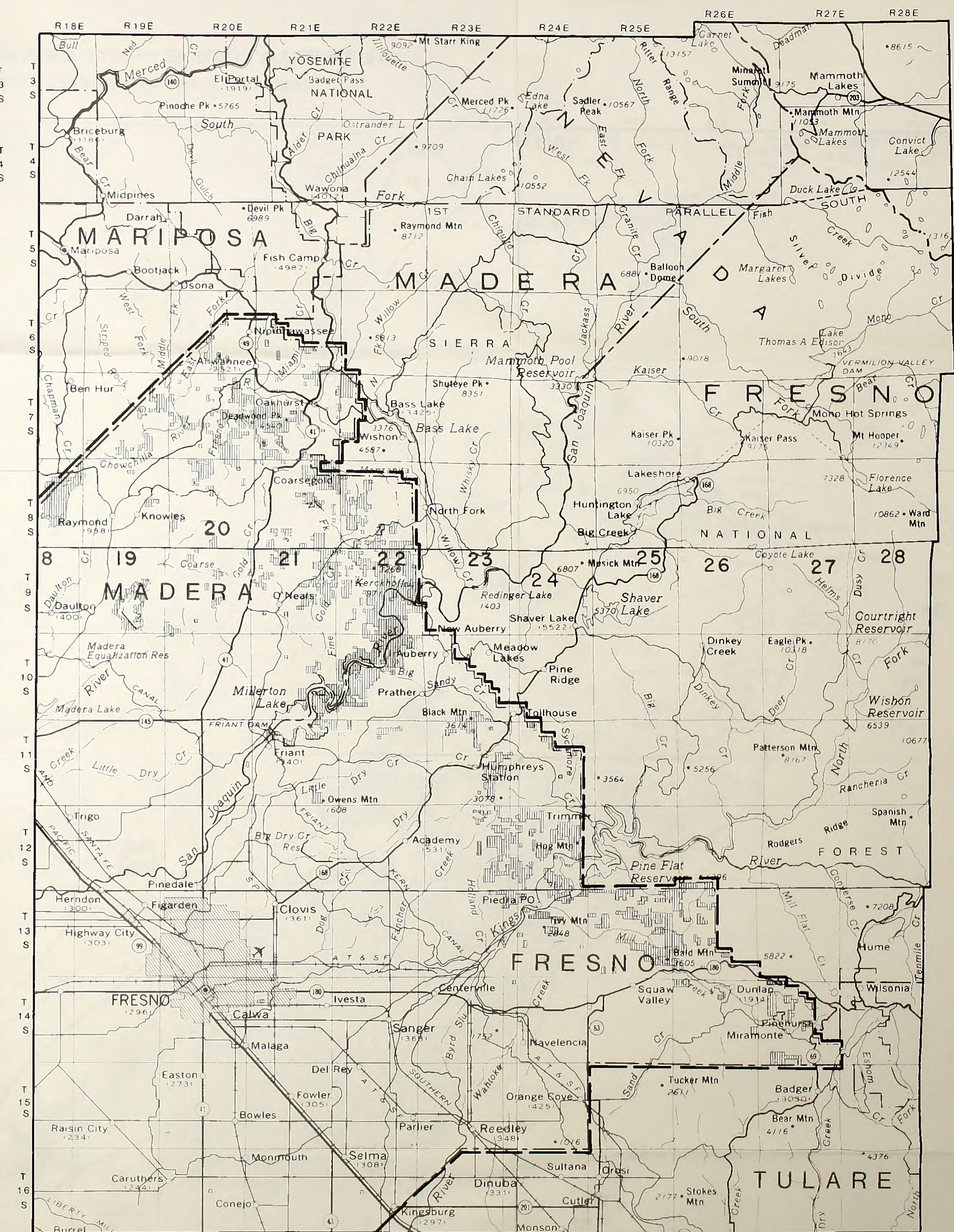
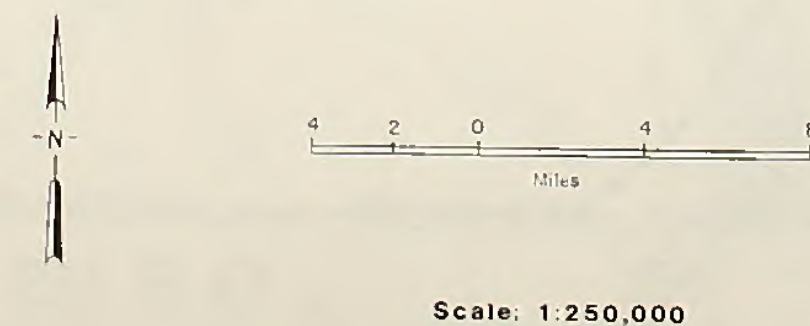


PLATE B

MAP 6





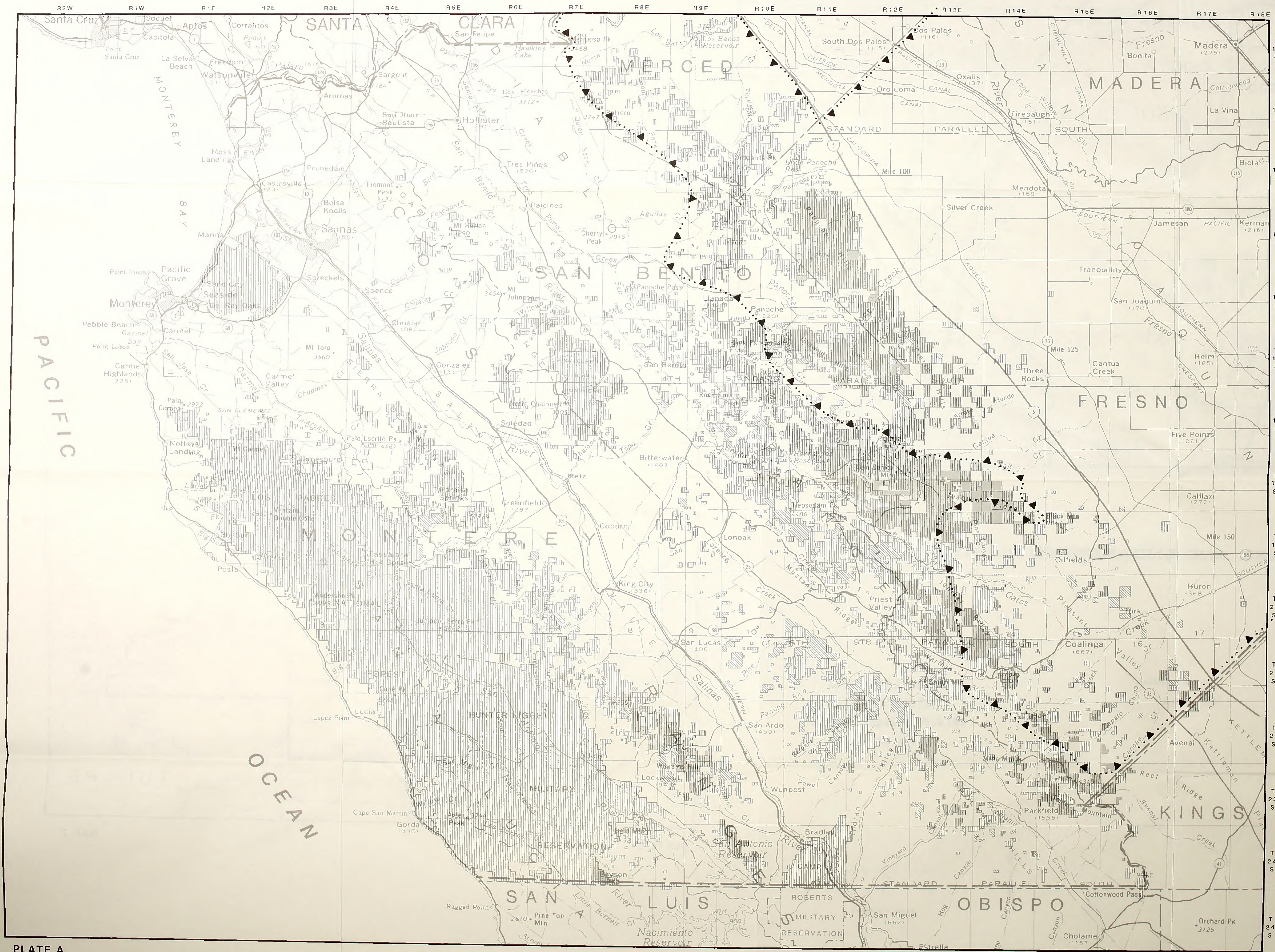


**Map 7**

**T&E Plant Habitat**



# THREATENED AND ENDANGEROED PLANT HABITAT

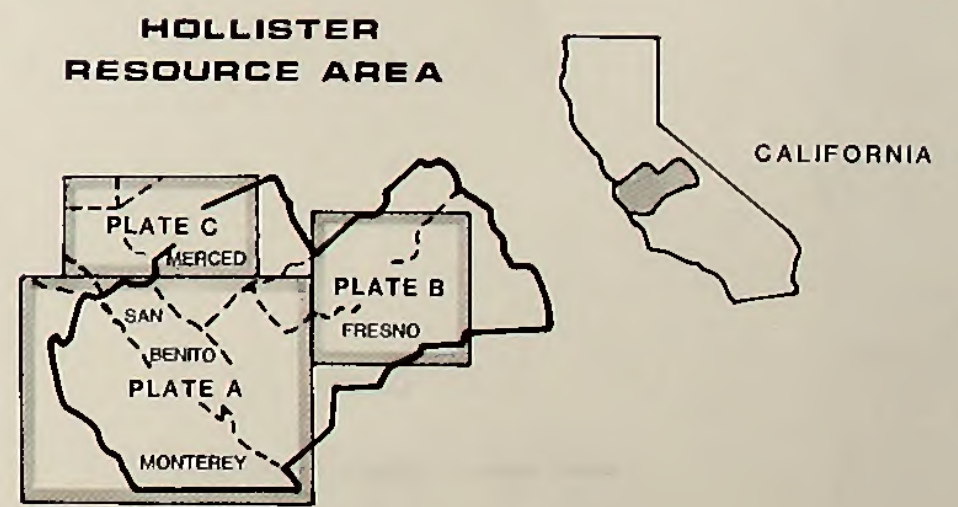
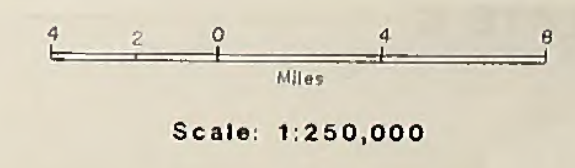


**LEGEND**

- Resource Area Boundary
- County Lines
- Public Lands (BLM)
- Threatened and Endangered Plant Species Habitat  
(Includes the California Jewel Flower, Hoover's Eriastrum and San Joaquin Woolly-Threads)

**Federally Owned Minerals**

- All Minerals
- Coal Only
- Oil and Gas Only
- Oil, Gas and Coal Only
- Other



## HOLLISTER RESOURCE MANAGEMENT PLAN



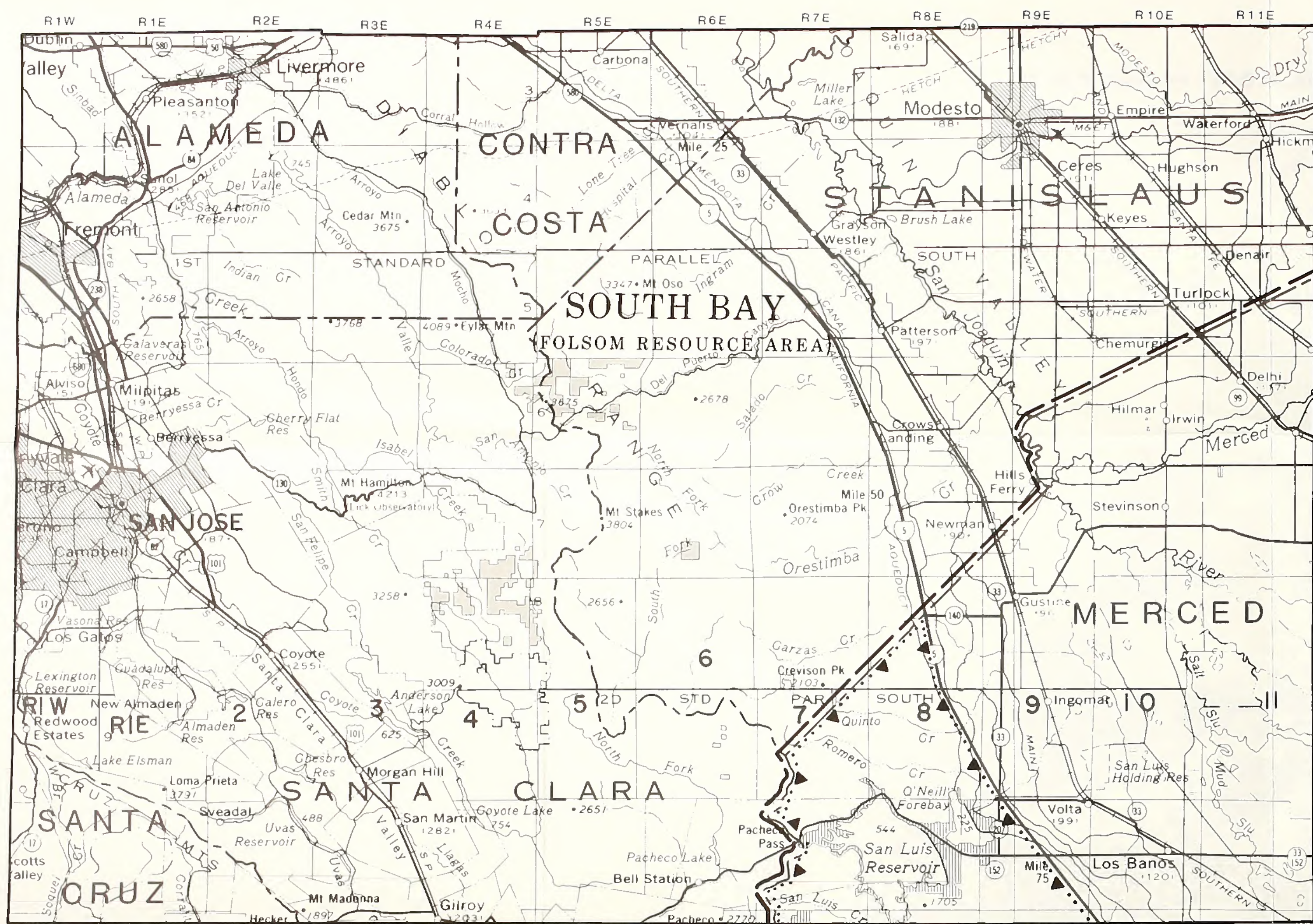


PLATE C

## THREATENED AND ENDANGERED PLANT HABITAT

## HOLLISTER RESOURCE MANAGEMENT PLAN

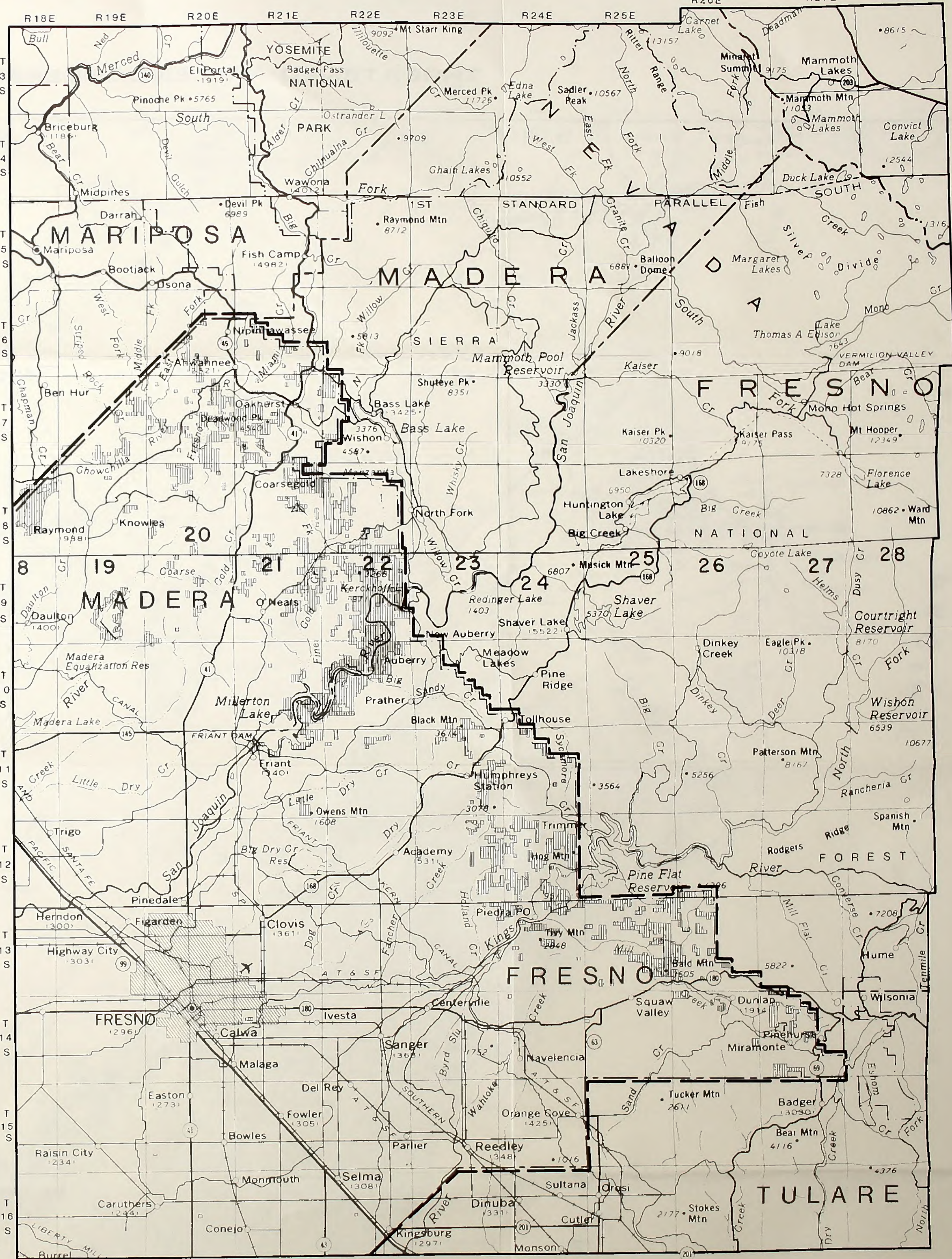


PLATE B

MAP 7





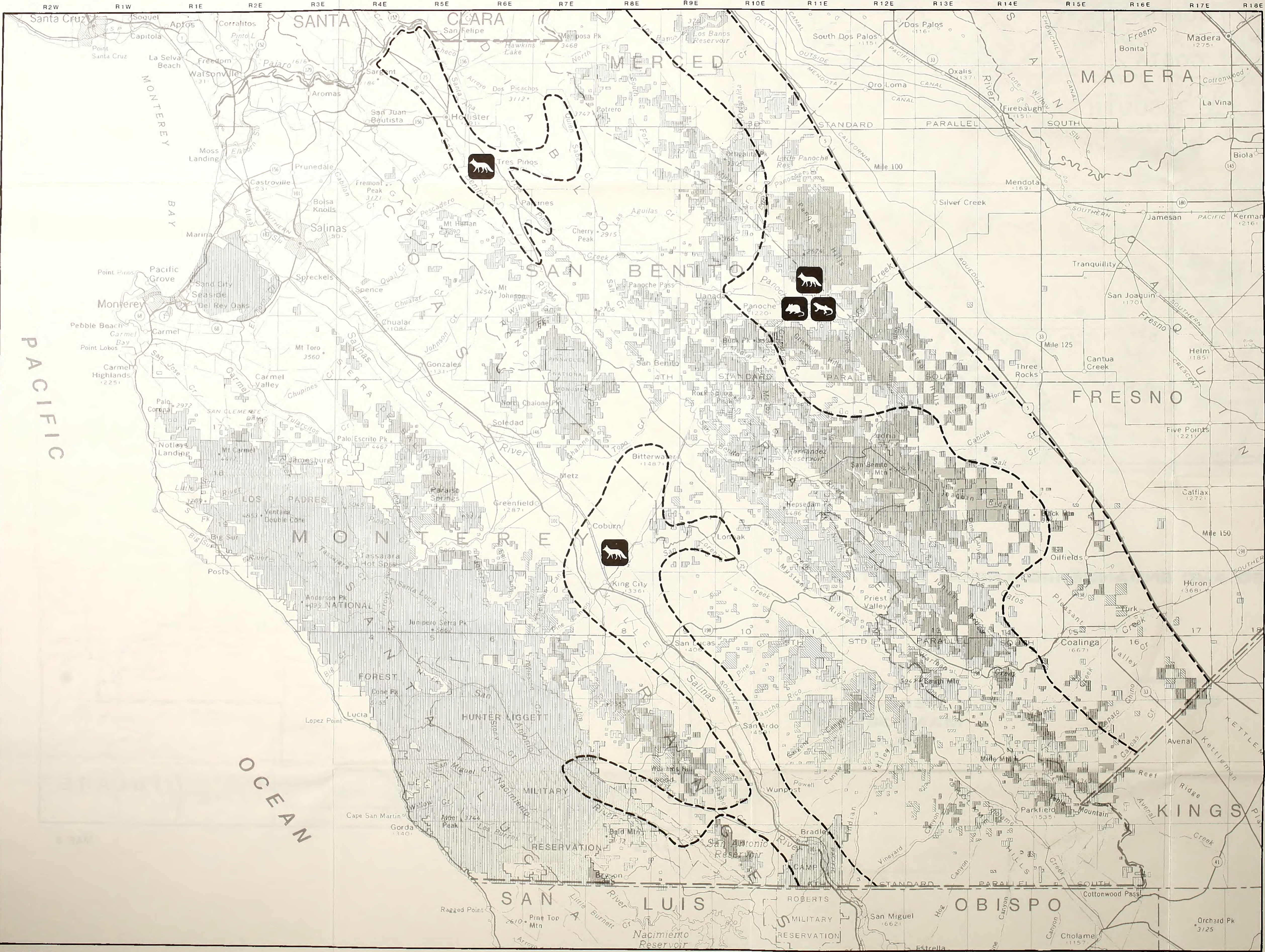


**Map 8**

**T&E Animal Habitat**



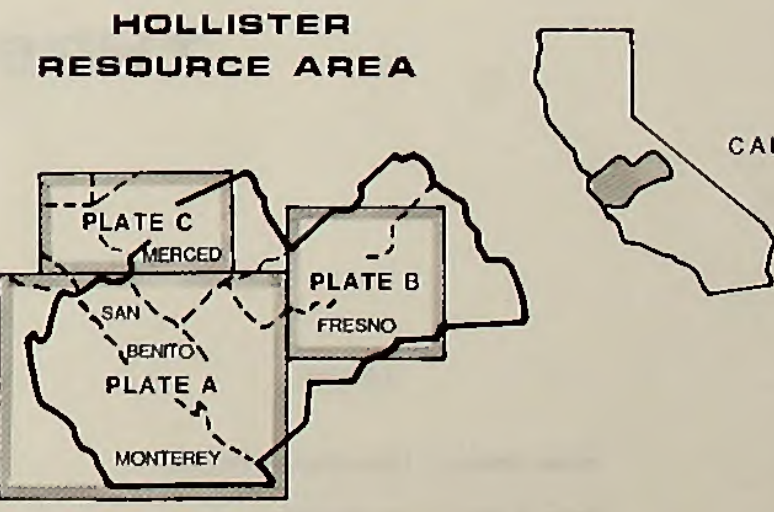
THREATENED AND ENDANGERED ANIMAL HABITAT



- LEGEND
- Resource Area Boundary
  - County Lines
  - Public Lands (BLM)
  - Threatened and Endangered Animal Species Habitat

- Blunt-nosed Leopard Lizard
- San Joaquin Kit Fox
- Giant Kangaroo Rat

- Federally Owned Minerals
- All Minerals
  - Coal Only
  - Oil and Gas Only
  - Oil, Gas and Coal Only
  - Other



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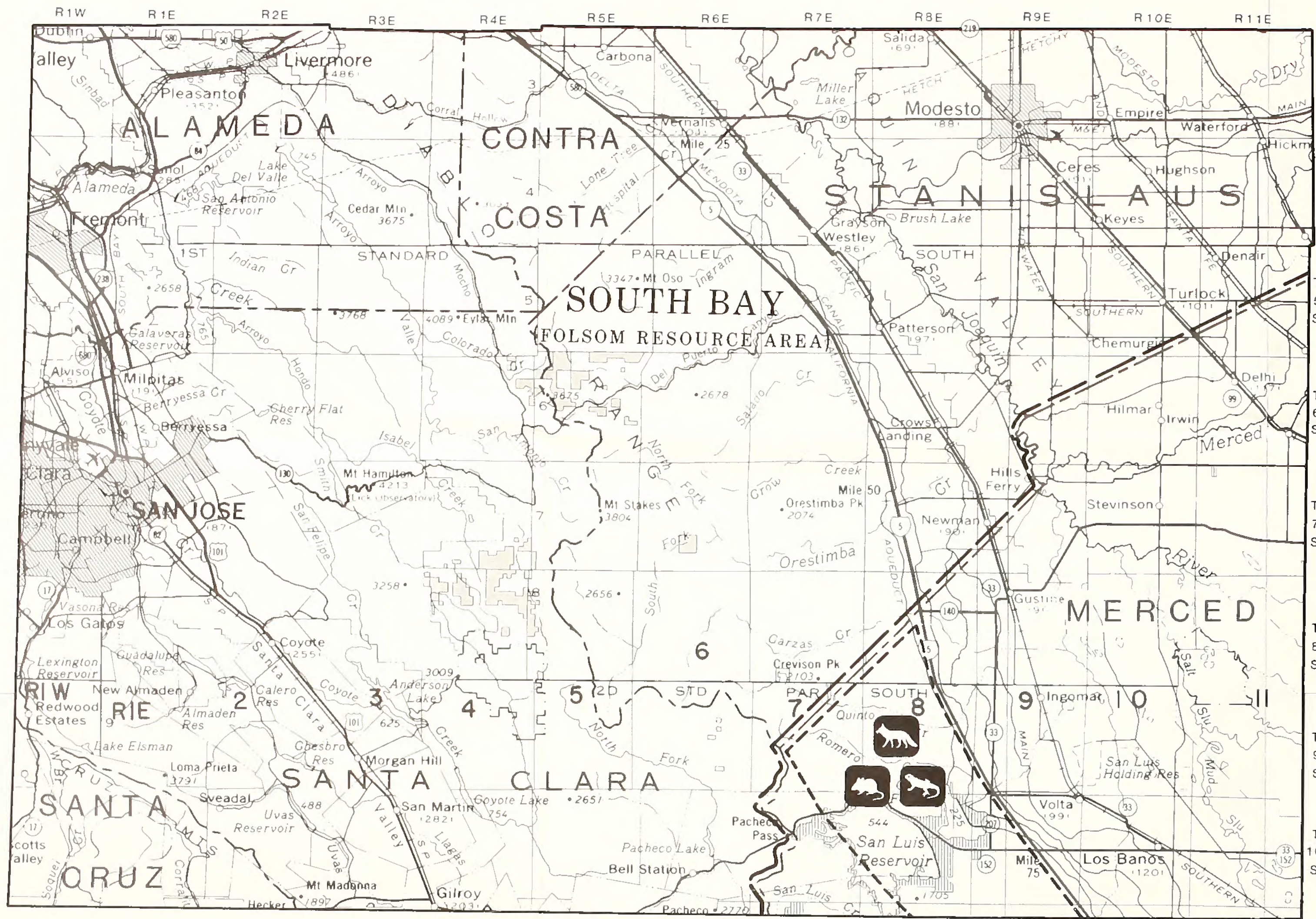
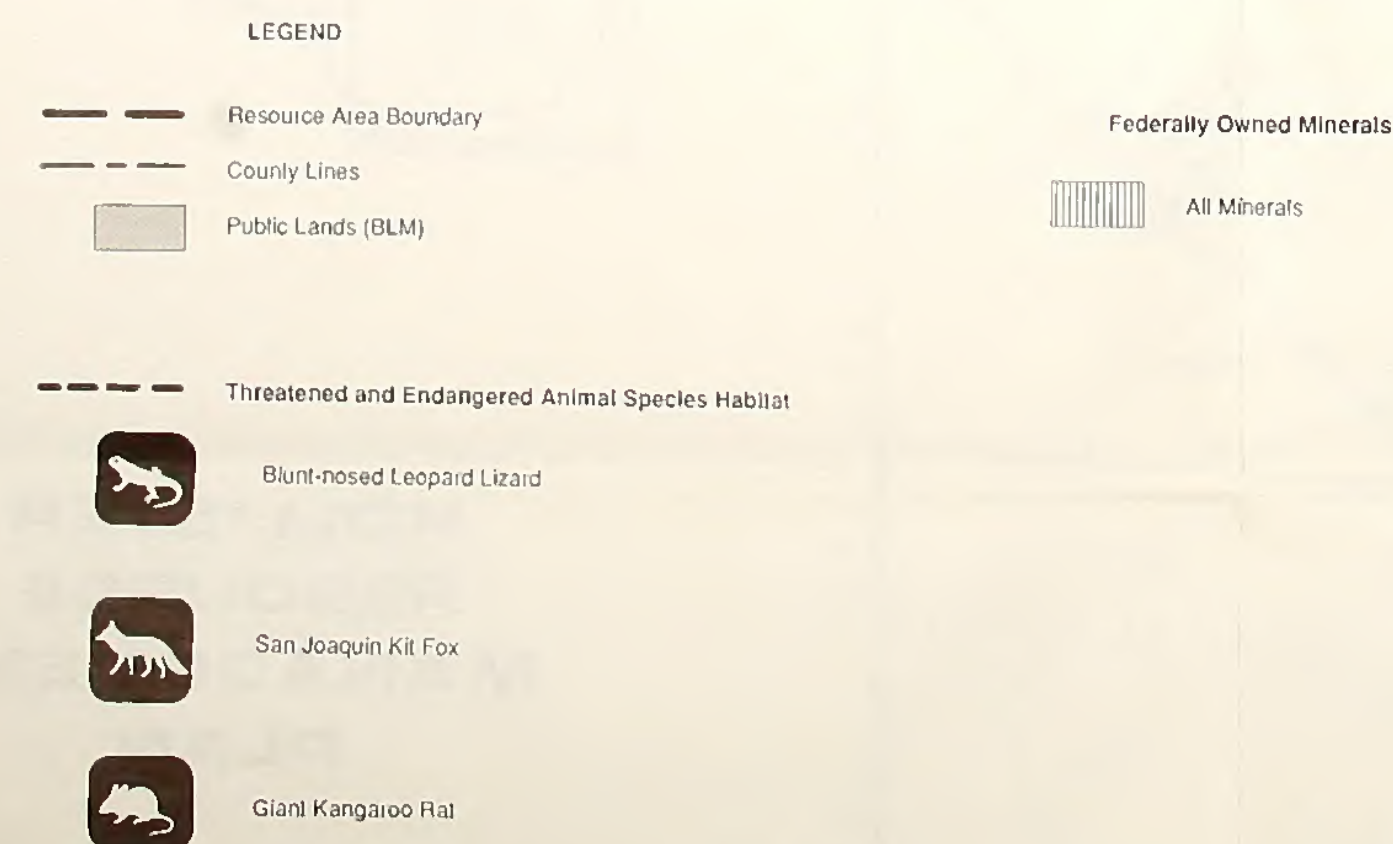
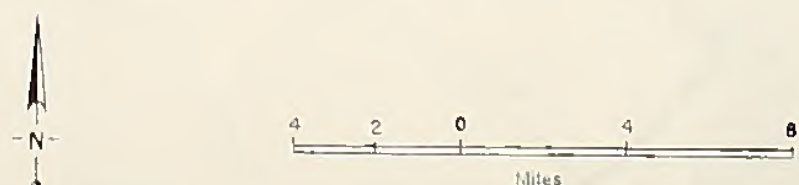


PLATE C

## THREATENED AND ENDANGERED ANIMAL HABITAT



## HOLLISTER RESOURCE MANAGEMENT PLAN



Scale: 1:250,000

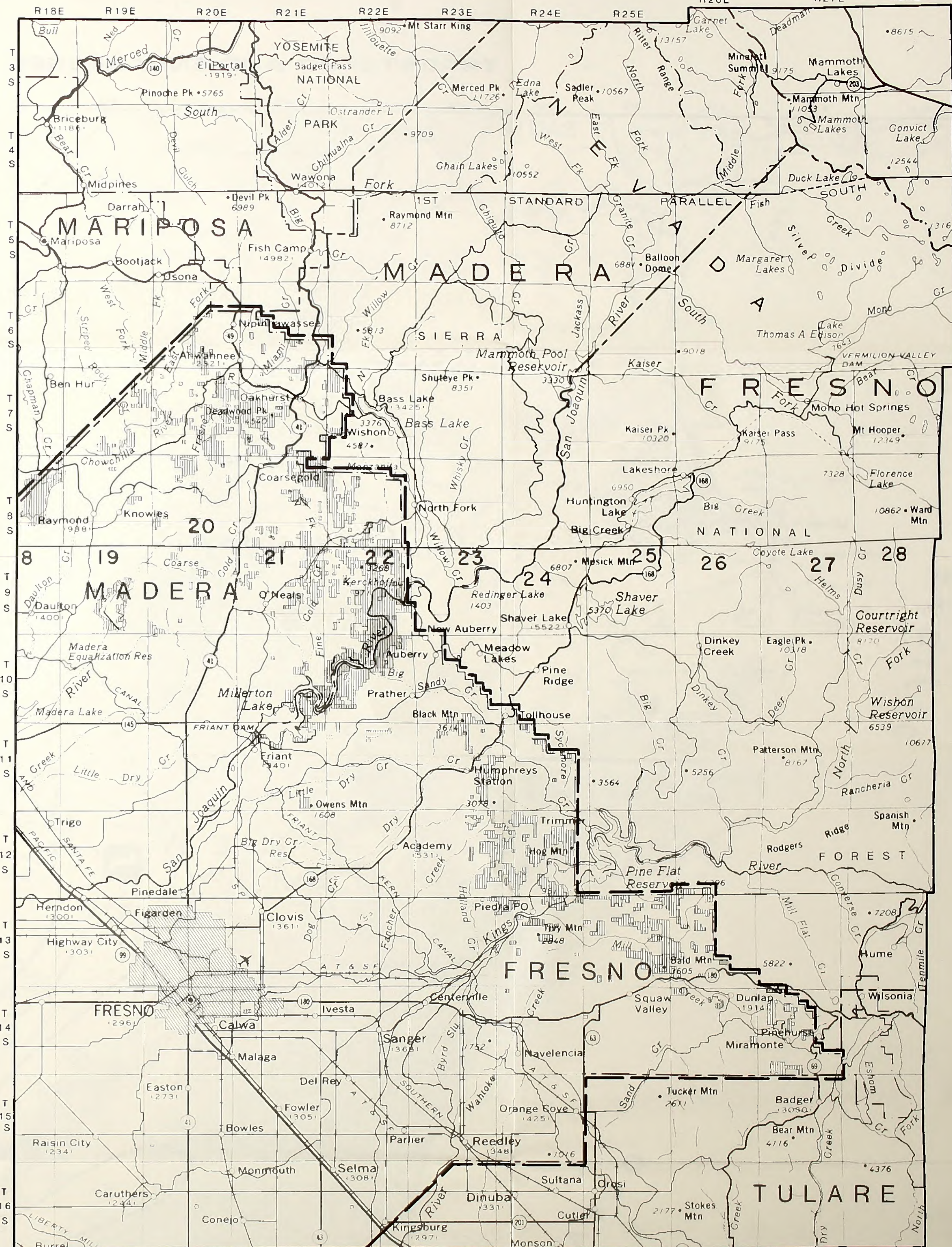


PLATE B

MAP 8



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